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GRAND RAPIDS MUNICIPAL POWER AND PUMPING PLANTS

Enlarging Pumping and Boiler Plants and Constructing New Building Around Them Without Interrupting Operation—Details of These Plants and of the New Electric Power Plant

By Samuel A. Freshney

IN 1905 a new charter was voted by the city of Grand Rapids, Mich., which provided, among other things, for the office of Secretary and General Manager of the Board of Public Works. This position the writer was selected to fill and during the year a thorough investigation was made of the city's pumping and lighting service. The result was that plans were formulated for combining them in one station, with such extensions as the requirements of the service necessitated.

Two bond issues were authorized. One of \$250,000 was to meet the expense of combining and enlarging the water

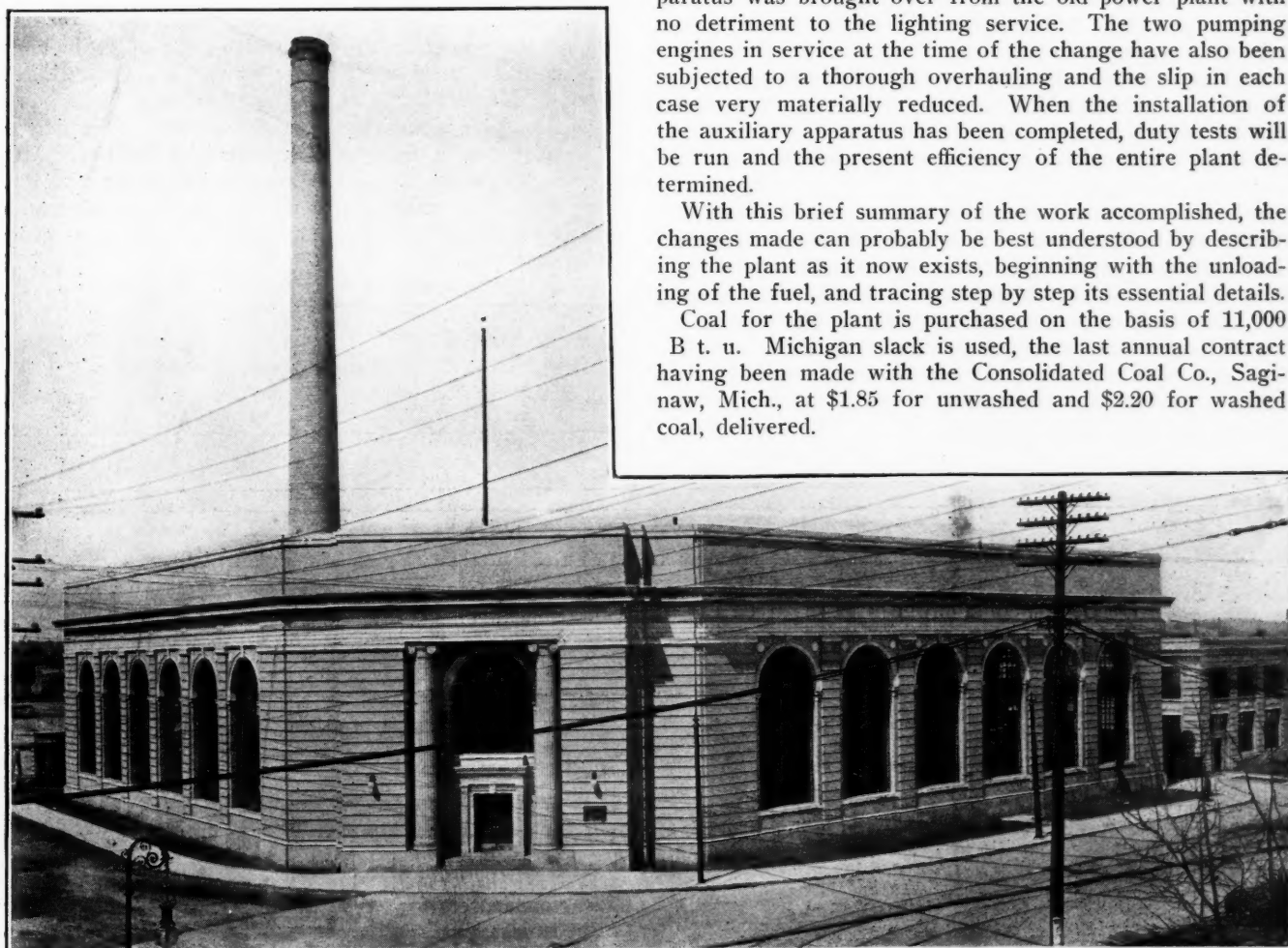
works and electric plants, but out of this \$75,000 had to be taken for water main extensions. Another bond issue of \$395,000 provided for a new filtration plant.

Plans for the enlarged station were completed in 1909 and the contract for a new 12,000,000 gallon pumping engine let March 18 of that year. The new building was erected completely around and above the old water works plant and without interrupting in the least the operation of the pumps then in service. New steam turbine units and motor-driven arc lighting machines were then installed, as the room became available, and the other electric apparatus was brought over from the old power plant with no detriment to the lighting service. The two pumping engines in service at the time of the change have also been subjected to a thorough overhauling and the slip in each case very materially reduced. When the installation of the auxiliary apparatus has been completed, duty tests will be run and the present efficiency of the entire plant determined.

With this brief summary of the work accomplished, the changes made can probably be best understood by describing the plant as it now exists, beginning with the unloading of the fuel, and tracing step by step its essential details.

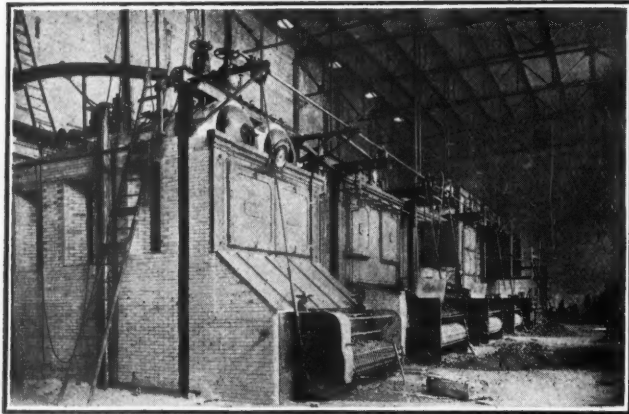
Coal for the plant is purchased on the basis of 11,000

B t. u. Michigan slack is used, the last annual contract having been made with the Consolidated Coal Co., Saginaw, Mich., at \$1.85 for unwashed and \$2.20 for washed coal, delivered.



NEW GRAND RAPIDS PUMPING AND ELECTRIC POWER STATION.

The coal is unloaded just outside the boiler house, where ample storage capacity has been provided. Thence it is taken in small dump cars, by means of a hydraulic lift, to tracks running transversely of the station above and in front of the boilers. Here it is discharged into bunkers of 200 tons capacity, which will be kept filled with about three days' supply of fuel for the plant. These terminate in hopper bottoms, with the usual sheet iron tubes or downcomers to the hoppers of automatic stokers.



BOILER ROOM. PLANT IN COURSE OF REMODELING.

Six boilers, two of 350 h.p., two of 360 h.p. and two of 370 h.p., are comprised in the equipment of the plant, or a total of 2,160 h.p., with large overload capacity. The boilers are all of the water-tube type and very similar in construction. The first four were built by the Babcock & Wilcox Co., New York (two in 1892 and two in 1910), and are equipped with automatic stokers from the Illinois Stoker Co., Alton, Ill.; while the two last named were built by the McNaul Boiler Mfg. Co., Toledo, Ohio, and have stokers of the type manufactured by the Laclede-Christy Stoker Co., St. Louis. These are driven by belts from overhead shafting operated by vertical automatic engines.

Ashes from the furnaces are removed in cars running in a tunnel and hoisted to ground level by means of a hydraulic lift.

Boiler feed is taken from the city mains, the supply being suitably regulated. There is a Webster heater of 2,500 h.p.

One stack, made of brick, which is very high, serves all of the furnaces, and the products of combustion are led to this through a tunnel. At the back of each furnace is a draft gauge supplied by the Schaeffer & Budenberg Mfg. Co., New York.

The most pleasing accomplishment of the new boiler plant is its smokeless operation. The city of Grand Rapids adopted a smoke regulating ordinance, and it was necessary for the municipality to set a good example to other stack owners.

The boiler plant was built from a standpoint of smokeless operation. The chimney of the old plant was one of the worst violators of the smoke ordinance. The chimney of the new plant is an example to every stack owner in the city as to what can be accomplished in the way of smokeless operation when a boiler plant is properly constructed. The new chimney is 225 feet high, and has a 100-inch flue, therefore ample draft is secured. The flue gases are carried into the stack underground through an 8 ft. x 10 ft. tunnel, thereby doing away with all overhead breeching.

The boilers are all B. & W. type, vertical baffle 4-pass, and each boiler is set with head room of 9 feet from the floor to the bottom of the header, which gives a large combustion chamber. Each boiler is equipped with a Dutch oven or brick extension which extends beyond the boiler front 4 feet 6 inches. Each boiler is provided with

a chain grate stoker equipment. The chain grate stokers were furnished by the Illinois Stoker Co. and Laclede-Christy Co.

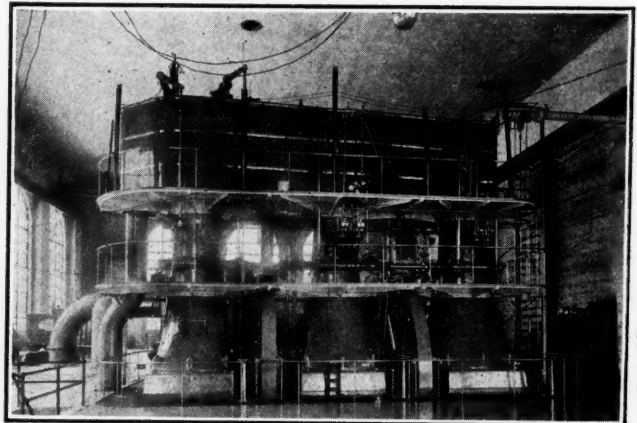
The steam is collected in a 16-inch header and distributed through 5 and 6-inch feeders to the various units in the engine room. Extra heavy Crane pipes and fittings, Jenkins valves, Anderson traps, etc., are used in the lines.

For the municipal electric power system the main installation comprises two Allis-Chalmers steam turbine units of 300 kw. each at 80 per cent. power factor, exhausting to Wheeler surface condensers, each having an 8-inch centrifugal and 12 x 24-inch piston pump driven by an American Blower engine. Gland water from condensation is collected in a tank and treated with compound. The electric units mentioned are supplemented at present by a Ft. Wayne generator direct driven by a Skinner engine which is used for lighting the municipal buildings, including the station itself. The terminal pressure is 2,300 volts. This set is controlled from a Ft. Wayne switchboard. Excitation for the turbo-generator sets is furnished at starting by a 25 kw. exciter driven by an Allis-Chalmers impulse turbine of the Patitz type and switched when running to an Allis-Chalmers induction motor generator set of similar capacity. The lighting service carried by the Ft. Wayne generator can be switched to the impulse turbine unit.

The arc lighting system includes eight General Electric machines. Six of these are driven in pairs from three belted Russel engines of 175 h.p. each, originally sold through the Chase Construction Co., Detroit. The two latest are connected by flexible couplings to a 242-h.p., 2,300-volt, 60-cycle, 514 r.p.m. Ft. Wayne synchronous motor. The arc machines are 6.6 amperes, 11,000 volts, of the Class 13 B design.

The switchboard is divided in two parts. That for controlling the power units was furnished by Allis-Chalmers Co. and the panels for the arc by the Ft. Wayne Electric Co.

The pumping plant comprises three units. The first of these, installed in 1892, was furnished by the Holly Mfg. Co., Lockport, N. Y. It has a normal capacity of 8,000,000 gallons in twenty-four hours and can be speeded up to deliver 10,000,000 gallons. The second, a triple-expansion horizontal, was built by the Nordberg Mfg. Co., Milwaukee, and placed in service in 1896. It is rated at 15,000,000 gallons and will deliver 18,000,000 to 19,000,000 gallons, if required. The latest machine is an Allis-Chalmers vertical triple-expansion pumping engine of 12,000,000 gallons capacity, with a 25 per cent. overload capacity.



NEW PUMPING ENGINE.

The condensers for each of these units are of the regular water works type, in which the suction water acts as the cooling element. In the intake and discharge piping, valves from the Chapman Mfg. Co. and the Roe-Stephens Co., of Detroit, are used.

The outside lubrication of the pumping and electric units is a gravity oil system, in which a Burt filter is included.

For the low service system the discharge is directly to the distribution mains, with a reservoir for the overflow; for the high service system water is pumped directly to the distributing mains, with a standpipe 60 ft. high and 50 ft. in diameter, of steel and concrete construction, taking the overflow.

The municipal lighting plant was originally located on what is known as "The Island" and was built about twelve years ago. It consisted of the three Russel engines and six 150-light General Electric multi-circuit arc machines. Steam was furnished from four 150-h.p. Aultman & Taylor boilers.

By combining it with the new plant a saving of at least \$7,000 yearly in operating expenses has been made.

The pumping plant originally installed comprised two units of 2,000,000 and 3,000,000 gallons capacity, built by Butterworth & Lowe, Grand Rapids. These were single stroke machines. They had been designed for only 40 lbs. steam pressure and eventually had to be operated through reducing valves on account of the boiler pressure being increased to 140 pounds.

Prior to the installation of the new 12,000,000 gallon pumping engine the existing units were ample in capacity to meet all the demands of the service for some years, but eventually, with increasing requirements, the pressure secured in the low service system, supplied by the Nordberg unit, fell to 65 lbs., and in the high service system, with the Holly pump operating, to 75 lbs. With the additional pumping power furnished by the new Allis-Chalmers unit a pressure of 100 to 105 lbs. is now maintained on the high service and a duty test was run for the new unit which showed that all of the rigid contract conditions had been more than fulfilled.

From the filter plant, which was very fully described in THE MUNICIPAL JOURNAL of November 1, 1911, there is a gravity flow to the pumping station, where a 7 ft. suction head exists, there being a 2 ft. fall in the invert of the clear water conduit, which is 2,700 feet in length. The new unit takes its suction only from the clear water con-

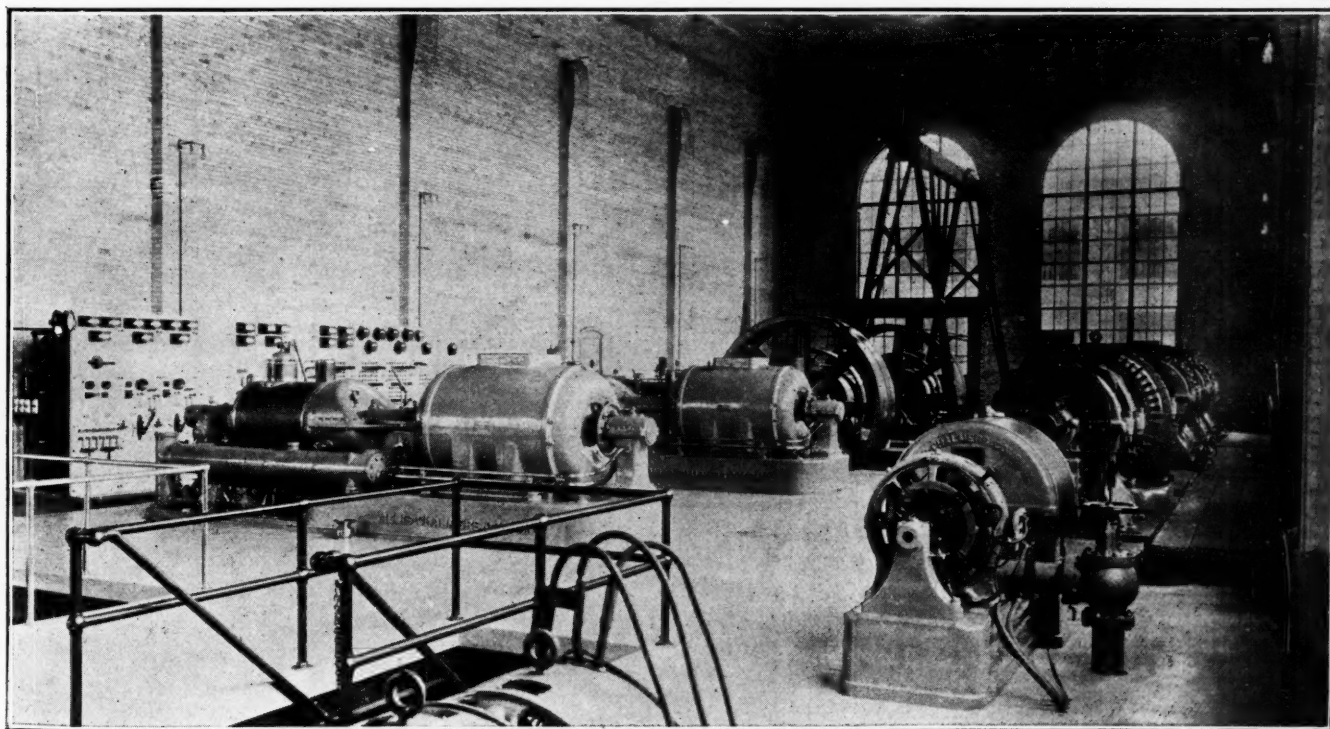
duit; but the older pumps have been so arranged as to be normally supplied from this source or, in case of emergency, from the old suction well, which still has its direct connection to the river. This safeguards the city from any danger of interrupted service due to a break in the supply from the filter plant and also affords increased protection in case of fire, having already operated to keep insurance rates at a lower level than would otherwise be the case.

The high and low service systems are linked together, with divider valves between.

During about eight months of the year it is possible to operate at speeds at or below normal, thus keeping the economy good. At the filter plant there is a Venturi meter and in the pumping station the records are kept from figures based on piston displacement. About 40 per cent. of the water consumption is now metered, and of the increased demand which would ordinarily be felt in the water works service as a consequence of the growth of population and industries, fully 15 per cent. has been offset by the reduction of waste brought about by metering.

In meeting the expense of the new plant, with the changes and overhauling which it involves, the service itself has provided from its earnings practically dollar for dollar what the city appropriated in the bond issue. This has been done on the basis of moderate rates to consumers and also to other departments of the city. The fire department, for example, is only charged five dollars per hydrant per annum.

Adjoining the pumping station is a small building in which a machine and forge shop has been installed. The superintendent of water works distribution acts as foreman of this plant. Under him are two skilled machinists, one of whom also serves as a smith, and two helpers. Of the last named, however, one is engaged much of the time in meter repair work. In winter the men who run the road rollers, sweepers, etc., are also busy overhauling their machines and giving such assistance in the other work of the plant as they are able to. Some work, such as rebor-ing engine cylinders, making castings, etc., has to be put out, but the plant takes care of most of the city's repairs and maintenance, at a saving of at least one-third com-



ELECTRIC UNITS IN GRAND RAPIDS PLANT.

pared with what it would cost if purchased. It can also be obtained much more quickly. The greatest gain, however, probably comes from the fact that, with such a plant available, nothing is suffered to run down. The equipment is kept at a high state of operating efficiency and deterioration reduced to a minimum. Inspection is frequent and thorough.

Above the repair shop is a laboratory in which supplies purchased for the city are tested, including brick, cement, bitumen, coal, etc. The gas supplied locally also comes under a regulating ordinance and tests are regularly made in the laboratory to determine whether it is kept up to standard.

In the construction of the new plant, all building footings and all machinery and boiler foundations were carried down to rock. So far as the old structure was concerned, this involved no difficulty until it came to the boiler room wall. The new one had to be erected on the same line as the old, for the reason that the flywheel of the Nordberg engine came too close on one side to permit setting it over in that direction and on the other the furnaces and boilers barred any restriction of space. Hence, in order to keep the necessary steam connections, the extension of the header was temporarily led through the boiler room addition and supported by a steel tower. Then it was supplied from the two largest boilers and the rest of the plant cut off while the old wall was torn down and the new one erected.

All of the engineering was done by the office of the Board of Public Works, and the subsequent building, wrecking and installation of machinery carried out by day labor under the direction of employees of the board. A visiting engineer, who figured the work over in several different ways, estimated that a saving of not less than 30 per cent., on the average, has been effected in comparison with what it would have cost to have let the work on a contract basis.

For handling the machinery in the station there is a 15-ton Shaw crane over the pumps and a 6-ton Pawling &

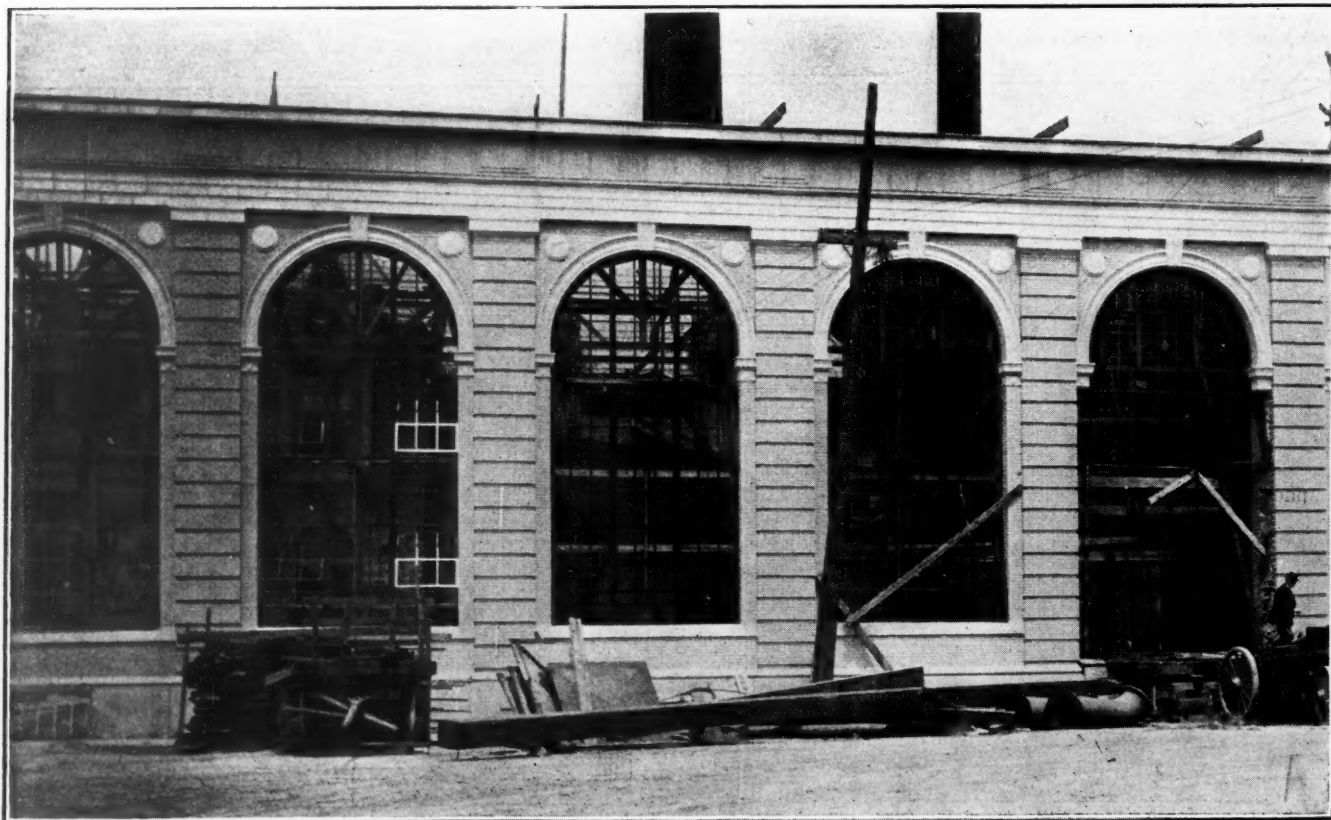
Harnischfeger crane over the electric units, both being hand operated. The building is of brick construction, with pressed Kittanning brick facing, and was designed by Williamson & Crow, of Grand Rapids. All structural columns and supports are of steel, furnished by the Cambria Steel Co. There are also installed a large number of "Lally" columns in the basement.

This new plant will furnish the electric current to drive the motors at the low lift pumping station, connected with the new filter plant, which is 2,700 feet north of the combination pumping and lighting station. The necessity of uninterrupted service has been always in mind and called for the following, which have been installed:

- (1) Duplicate turbo-generators.
- (2) Duplicate condensers for above.
- (3) Duplicate suction lines to condensers.
- (4) Duplicate exciters for turbo-generators.
- (5) Duplicate condensers for pumping engines and reciprocating engines which drive lighting generators.
- (6) Duplicate circuits to filter plant.
- (7) The installation of a large barometric condenser which can be used in case of emergency on the reciprocating pumping engines and the other steam units.

One of the features of the plant that most strongly impresses visitors is its practically smokeless condition, the explanation for which is to be found in the section of this article devoted to the furnaces, particularly the boiler settings and draft. Further refinements are to be introduced, including the installation of CO₂ recorders, etc. A station log is carefully kept and as soon as the work of reinstallation of the older equipment is fully completed, efforts will be made, by means of daily comparisons of operating records, to bring about further improvements in economy as far as these can be effected.

This work will be in good hands, as L. D. Cutcheon, whose ability is well recognized among municipal engineers, has recently been appointed successor to the writer, who resigned to enter upon other duties. William M. Gormley, an engineer of recognized ability, is chief engineer of the new plant.



BUILDING NEW STATION AROUND OLD PUMPING STATION.

After the new building was completed the old one was torn down.

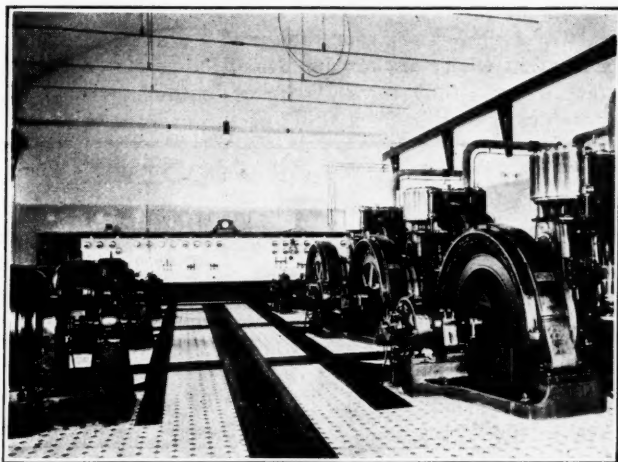
OZONE TREATMENT AT ST. PETERSBURG

Largest Ozone Water Purification Plant in the World—
General Description—Bacterial Efficiency

By FRANCIS P. MANN.

THE ozone water purification plant which was installed at St. Petersburg, Russia, something over a year ago is the most extensive one of its kind in Europe. The water of the city is derived from the Neva River, which not only has a very decided yellowish-brown color but also is heavily charged with germs of typhoid and cholera, and has undoubtedly been the cause of epidemics in the past. This plant is designed on the French Otto system, and its adoption was due to Professor Rein, president of the Medical Council of the Empire, who after visiting the Otto ozone plant which was in operation at Nice, France, made arrangements with the company to prepare plans for a large plant of the same kind for St. Petersburg. The Municipal Council was impressed with the apparent practicability of the scheme and readily voted the funds for constructing the plant. The actual construction and instalment was performed by the Paris Otto company, the Russian Siemens-Halske firm and others.

The plant is designed for a daily output of about 13,-

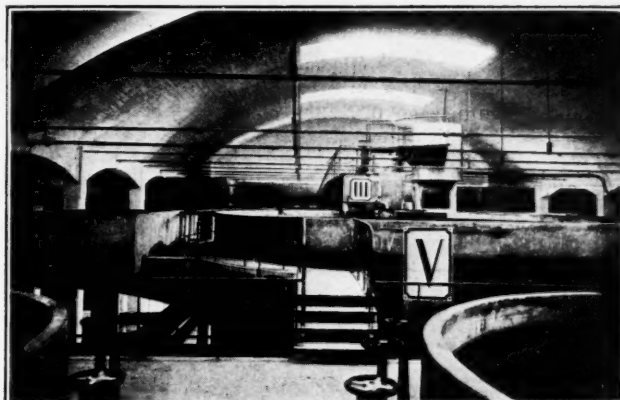


ELECTRIC PLANT.

At the right, steam-driven lighting motors; at the left, motors for ozone production.

000,000 gallons. It occupies a large building 400 feet long on the principal arm of the Neva and contains a filtering plant as well as an ozone-treating plant. The station is divided into three separate parts—the central electric plant, which supplies the current; the coagulating and filtering basins, and the ozone sterilizing plant. The electric plant comprises a set of three engine-driven alternators of the usual electric-lighting type, working at low voltage (120 volts), and motor generator sets for supplying the high-tension current needed for the ozone-producing apparatus. The coagulating basins are designed of such capacity that the water remains in them for a period of two hours after receiving the required amount of sulphate of alumina. From these the water passes to the filters, which are 38 in number, of the rapid or mechanical type. After being filtered the water is sent into a general collecting conduit 39 inches in diameter, built of reinforced concrete, which carries it to the ozone-treatment plant.

In the ozone plant is installed apparatus designed to bring the ozone into intimate contact with the water by the Otto method. The ozone producers, which are located in another part of the plant, furnish air heavily charged with ozone by means of electric discharges, and this air is brought into what are known as "self-contact" or water-mixing columns, which are fed by the general conduit.



COAGULATING AND FILTER BASINS.

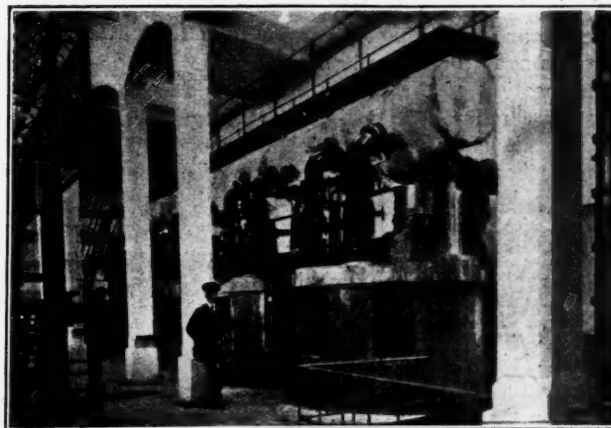
There are five units, each having a capacity of about 3,000,000 gallons per 24 hours.

The actual purification effected by this plant is very carefully observed by daily inspections and by analyses made by the laboratory located at the plant, and also by the municipal laboratory. The contract with the city requires that the water should not contain any pathogenic germs whatever (especially typhoid and cholera germs), the test of this to be that the number of *B. coli* per 100 c.c. should be zero, according to the French method of testing, and the number of germs of all kinds should be less than ten. In addition, the water is to be entirely clear. The accompanying table gives figures taken from

REDUCTION IN BACTERIA EFFECTED BY ST. PETERSBURG
PURIFICATION PLANT.

(Figures taken from the books of the laboratory at the water plant.)

Dates.	Raw water		B. Coli in 100 c. c.	Treated water.		B. Coli in 100 c. c.
	No. of germs per c. c. at end of 48 hrs.	5 days.		No. of germs per c. c. at the end of 48 hrs.	5 days.	
Feb. 15.....	175	313	Present.	Less than 1	2	0
" 16.....	158	367	"	Less than 1	1	0
" 17.....	258	713	"	0	Less than 1	0
" 18.....	216	696	"	Less than 1	1	0
" 19.....	180	180	"	Less than 1	1	0
" 20.....	171	522	"	1	4	0
" 21.....	221	Liquefied.	"	1	3	0
" 22.....	304	"	"	Less than 1	2	0
" 23.....	...	"	"	0	5	0
" 24.....	334	493	"	Less than 1	1	0
" 25.....	154	383	"	0	1	0
" 26.....	525	Liquefied.	"	Liquefied.	"	"
" 27.....	275	485	"	3	5	0
" 28.....	295	486	"	1	2	0
April 1.....	370	Liquefied.	"	Less than 1	1	0
" 2.....	730	1000	"	1	1	0
" 3.....	808	Liquefied.	"	0	2	0
" 4.....	2900	Liquefied.	"	Liquefied.	"	"
" 5.....	2891	Liquefied.	"	1	1	0
" 6.....	Liquefied.	"	"	1	2	0
" 7.....	"	"	"	1	Less than 1	0
" 8.....	"	"	"	1	3	0
" 9.....	"	"	"	1	Less than 1	0
" 10.....	"	"	"	1	1	0
" 11.....	"	"	"	1	1	0
" 12.....	"	"	"	2	2	0
" 13.....	4000	"	"	1	2	0
" 14.....	Liquefied.	"	"	1	2	0
" 15.....	"	"	"	0	2	0
" 16.....	"	"	"	0	2	0
" 17.....	"	"	"	1	1	0



OZONE STERILIZERS.

Each unit consists of four mixers and a "self-contact" column. At the top is 39-inch concrete pipe.

the books of the laboratory at the purification plant. In addition, tests are made by the municipal laboratory from time to time of water drawn from consumers' faucets. On March 17, 1911, a sample taken at a dwelling house was found to contain no *B. coli* in 50 c.c. of water, and on March 23, 26 and 30 and April 1 samples were taken from other dwelling houses which on analysis showed no *B. coli* in 100 c.c. of water.

We have no figures showing the reduction of bacteria caused by the filters and the ozone plant respectively. The clarification, which is said to be entirely satisfactory, is probably due entirely to the coagulant and filters.

ICE TROUBLE AT BUFFALO

Anchor Ice on Intake—Slush Ice Clogs Pumps—Methods of Handling These—Plans for Prevention

Paper before *American Water Works Association* by HENRY L. LYON, Deputy Water Commissioner of Buffalo, N. Y.

THE city of Buffalo takes its water supply from Niagara River and Lake Erie and pumps it direct into the city mains. The source of supply is unlimited; it is only a question of being able to get it to the consumers on time. The reservoir holds 116,000,000 gallons, but has not sufficient elevation to supply more than half the city and would not supply that part satisfactorily for more than a few hours. The daily average consumption of the city is 135,000,000 gallons and at times it runs up to 200,000,000 gallons. The reservoir on the low service and the water tower on the high service act more as balance wheels in regulating the pressure.

The old intake pier is situated about the middle of Niagara River and 1,000 feet from the pumping station, which is situated on the bank of the river. The intake is built in the narrowest part of the river about one mile from the head of the river and the foot of Lake Erie. The current is from seven to fifteen miles per hour. The pier is connected to the suction wells in the station by two tunnels under the river. One is six feet in diameter, the other six by twelve feet in cross section. The ports to admit the water are about four feet above the bottom of the river and on both sides of the pier. The river at this point is sixteen feet deep, the bottom being smooth limestone rock, with scattered boulders. On the sides of the pier are ice shields of steel extending to two feet above the bottom of the river, so that the water must enter the pier under the shields and from the bottom of the river, not the surface; but on the sides of the shields are gates that can be opened or closed so that the water can be drawn from the surface if ice troubles close the lower levels.

When ice is running down the river, the current turns it over and over and churns it up, forcing large quantities to the lower levels, so the river is a floating mass of ice its whole depth. When the lake becomes frozen over a certain phase of our ice trouble is over for the winter and does not bother us again until the break up in the spring.

The location of the pier, however, with a swift running river for a mile above so it cannot freeze over, makes an ideal situation for frazil, anchor or ground and slush ice.

The anchor ice forms on the ports of our intake pier, so as to completely close them. The small particles seem to rise out of the water, like bubbles out of champagne, and attach to the sides of the openings, then to each other in lighting rapidity, until the whole opening is closed and cannot be broken open by pike-poles. We then resort to small charges of dynamite.

Runs of ice of all the varieties, sometimes separately, more often all of them mixed into slush, get into the intake, pass down through the shafts and tunnels and then into the suction canals, or wells, in such quantities that it clogs the pumps. At times the mixture is so solid that water will not pass through it to the pumps, and the pumps must be

stopped entirely. If the ice is formed at a very low temperature, it is very hard and difficult to melt.

We have revolving screens in the canals with which we can raise large bodies of the ice above the water and then melt it with hot water and steam. We also at times will have a hundred or more men dipping the mixture on to shelves or racks in the wells, above the water, with long handled scoops, like minnow nets, but made of heavy wire, and then melting it with hot water and steam.

Niagara River for its full length (35 to 40 miles) is too swift for surface ice to form, so that anchor and frazil ice form readily. It is this ice mostly that runs over Niagara Falls in such quantities that it banks up below the falls and forms the ice bridge every winter, which becomes so solid that people walk over the river just a short distance from and in plain view of the falls. It was this same kind of ice that dammed up the mouth of the river and caused the big floods there a few years ago. And the same kind of ice has caused floods at Montreal in the middle of winter, when there had been no rains or any warm weather to melt the snow, but the floating anchor and frazil ice had been carried under the surface ice in such quantities as to completely fill the bed of the St. Lawrence River and thus formed a dam over which the whole of the river must flow.

Our new intake pier is built at the head of the river and foot of Lake Erie in water 24 feet in depth. The current at this point is only about two miles per hour. The lake freezes over up to and around the pier. We believe we are in a location where anchor and frazil ice cannot form, the surface ice will only form 15 inches in thickness and our ice troubles are probably a thing of the past.

INCREASING DEPTH OF WOODEN TANKS

By A. H. MEYERS, Supt. of Columbia, Pa., Water Company.

THE filter plant of the water works of which the writer is superintendent provides for sedimentation of the raw water by the use of four tanks connected in series. These tanks are 25 ft. in diameter and originally were 17 ft. deep, with four baffles in each, the tops of the tanks being on the same level as the tops of the filter tanks.

This arrangement resulted in a loss of head of about 18 inches on the filters and made hand control necessary for both inlets and outlets. It also shortened the runs and increased the amount of wash water used.

The settling tanks, which are built of 3-inch cypress, being buried 9 feet in the ground, it was not deemed possible to elevate them, so it became necessary to increase the height of the sides of the tanks. When the makers of the tanks, one of the largest tank building concerns in the East, were asked to undertake this job they refused, saying that all attempts at such work had failed. We then asked them if they would build tanks, with staves 5 feet long, around the outside of the old tanks, the new staves to project down 2 feet below the top of the old staves and to extend 3 feet above them, guaranteeing the new work not to leak in the vertical seams and to fit the outside of the old tanks tight enough to sustain the weight of the new work and of the conical roofs, and this they agreed to do.

The joint between the outside edge of the top of the staves of the old tanks and the inside of the new staves we took care of by chamfering the outside edge of the old staves back $\frac{1}{2}$ inch and down 3 inches. This joint was caulked with oakum to a depth of one inch and then poured until full with melted asphalt roofing pitch.

The new work was erected and the tanks filled with water in six days, and one week later practically all leakage had stopped.

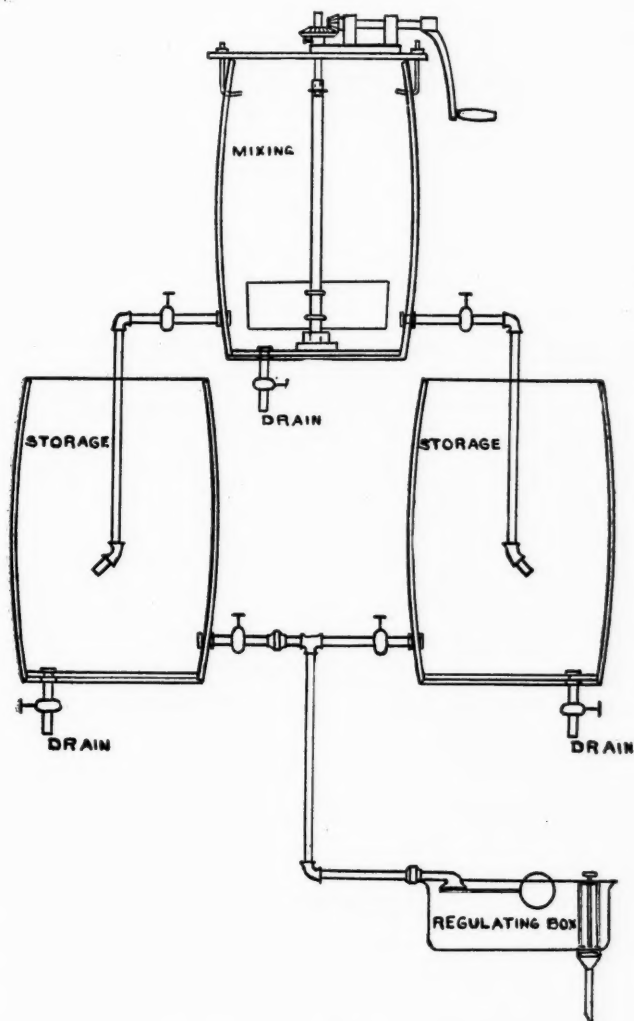
This work was completed about nine months ago and since then has passed through very hot weather and the most extreme cold weather of which we have record and now shows no signs of leakage.

This increase of 3 feet in the depth of settling tanks has permitted us to install both inlet and outlet controllers and to overcome the other difficulties caused by lack of head on the filters, and in addition has given about 45 minutes longer for sedimentation.

EMERGENCY HYPOCHLORITE PLANT

THE State Board of Health of Indiana has constructed an emergency hypochlorite plant which is simple but at the same time complete, and which it offers to instal at any water supply at no cost to the municipality or corporation save the actual expense of transportation and operation.

Three barrels are arranged as shown, one for mixing and two for storing the solution. In the mixing barrel the hand-operated mixing device aids in dissolving the chemical. After a thorough mixing the solution is allowed to settle and clarify and is then run into one of the storage barrels. The second storage barrel is provided to avoid any interruption of the treatment.



TEMPORARY HYPOCHLORITE PLANT.

The flow of the solution is controlled by the regulating box, which is equipped with a hard rubber float, which maintains a constant head over a slot, and in this way a uniform feed is obtained. The solution is preferably fed into the suction well, or if this is not feasible it can be injected into the suction pipe of the high pressure pumps. The sketch plainly indicates the details of the construction.

The State Board urges health officers to use this outfit

whenever prompt action is required to protect consumers from typhoid fever.

HYPO. STERILIZATION AT KANSAS

Paper Before American Water Works Association by S. Y. High, Superintendent of Kansas City Water Works.

THE water supply of Kansas City, Mo., is taken from the Missouri River about five miles above Kansas City, at the Quindaro Station in Kansas. The water is pumped directly from the river into settling basins. The water is then treated with lime and sulphate of alumina. After leaving the basins through the back flow or suction pipe, the hypochlorite solution is introduced, before the water gets to the pump, the pump agitation making a thorough mixture of the hypochlorite with the water.

From the Quindaro station the water is pumped to the Turkey Creek station twelve million gallon reservoir, and from this reservoir to the service mains.

Following the demonstration at Boonton, N. J., in 1909, of the reduction of bacteria by the introduction of minute quantities of "available chlorine" with water more or less polluted, and the acceptance of the process by the courts as a proper method to be employed in connection with a municipal water supply, the question of the efficient introduction of hypochlorite of lime solution and the mechanical appliances suitable for the purpose engaged the attention of the Fire and Water Commissioners of this city. They ordered the city chemist, Dr. W. M. Cross, to make a trip of inspection of several cities known to have the hypochlorite sterilization system in satisfactory operation.

Dr. Cross found the method of installation of the system both easy, cheap and satisfactory. The Fire and Water Commissioners immediately took steps to install this system of treatment for the entire municipal water supply of Kansas City. During the year 1911 an experimental installation of the hypochlorite process was so successful that the commissioners undertook the construction of a permanent building and apparatus for the application of this purification process to the water supply.

A separate building was constructed to make possible the satisfactory storage, handling and making of the solution of hypochlorite ready for mixing with the sedimented water. The building itself was designed by W. C. Root, an architect, and the apparatus for use in connection with the sterilization process was installed under the direction and supervision of Burton Lowther, engineer in charge.

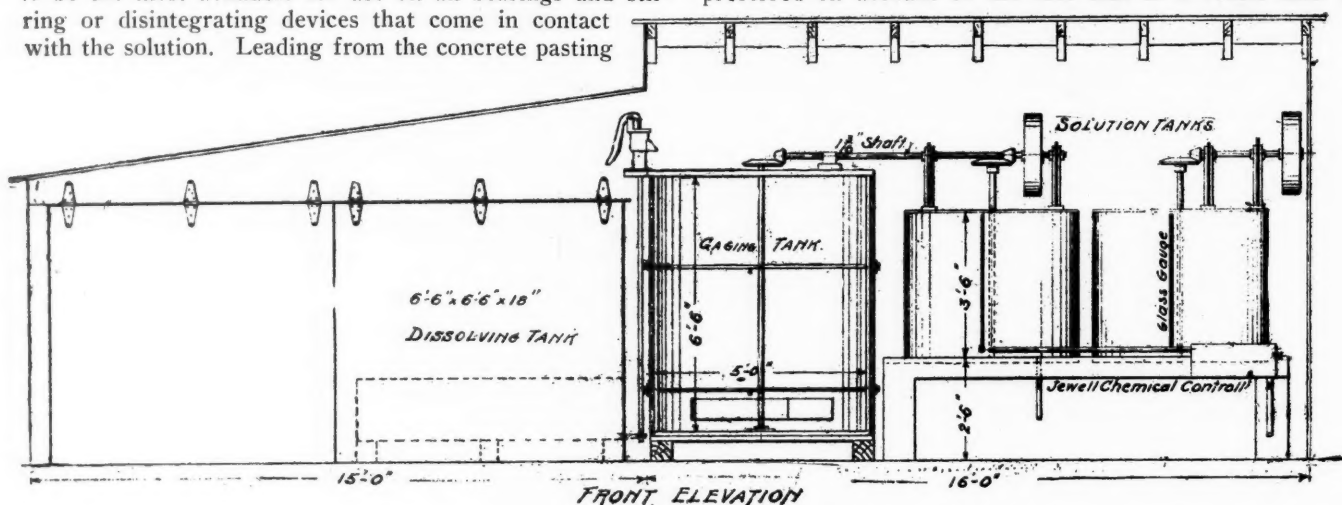
The apparatus for the handling of the hypochlorite and the supports for it are of reinforced concrete. It is to be observed that no other material is so well suited for use in connection with this sterilizing agent as good concrete, for the reason that all other materials that are capable of oxidation are promptly attacked by the hypochlorite solution and become rapidly deteriorated. The prime consideration with regard to this class of installation is to employ such methods of construction and to use material that is so permanent in character as to obviate the necessity of repairs which would force the discontinuance of the application of the sterilizing agent even for an hour.

The basement of the building is used for storage of the reagent that is kept in reserve. The main floor is used to house the dilution tanks and the feeding devices, while on the floor above is placed the tank in which the hypochlorite is reduced to paste of a creamy consistency before being delivered to the dilution tanks beneath. This pasting tank, three feet in diameter and four feet high, is provided with a stirring device carrying two rather heavy rollers disposed horizontally at its lower end.

The rollers clear the bottom of the concrete tank only

by a fraction of an inch, thus insuring the mashing and disintegration of all of the small lumps that are invariably present in commercial calcium hypochlorite. Owing to the fact that the action of the reagent on bronze is to form on the surface of it a fairly insoluble and protective coating of metallic carbonate and oxychloride, that metal appears to be the most available for use on all bearings and stirring or disintegrating devices that come in contact with the solution. Leading from the concrete pasting

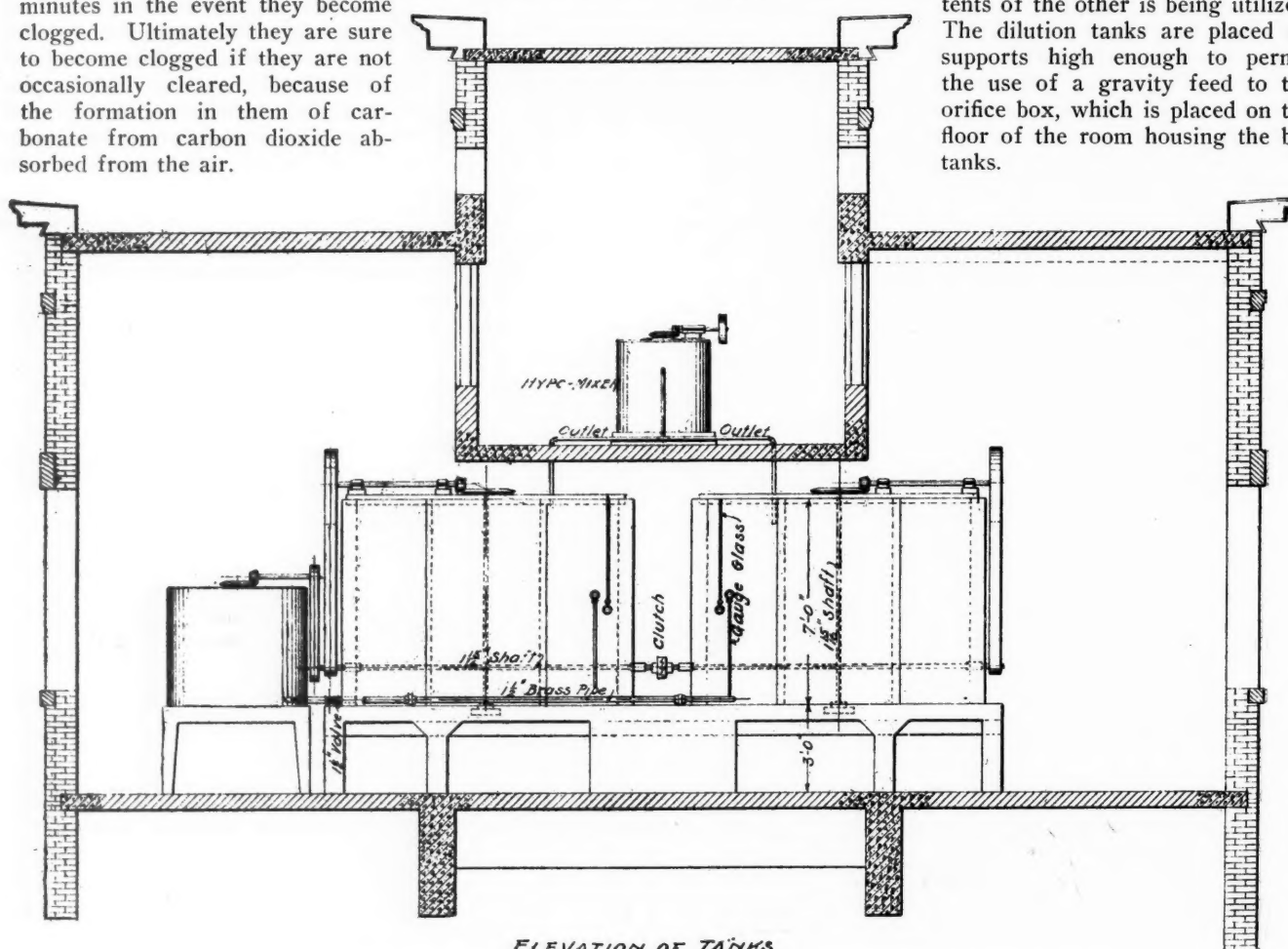
The dilution tanks are hexagonal in form, nine feet in maximum diameter and seven feet high. Their walls are six inches thick. Although the difficulty experienced in properly disposing the reinforcing iron in the construction of a hexagonal tank is much greater than is the case in the building of a round one, the hexagonal tank is to be preferred on account of the fact that in a round tank a



EXPERIMENTAL HYPOCHLORITE PLANT AT

tank are pipes so arranged that the contents of the tank may be discharged into either of the large dilution tanks on the floor beneath. The outlet of the pasting tank is placed at a considerable distance from its bottom so as to avoid the possibility of drawing off with the paste any fragments of considerable size. The pipes carrying the paste are so arranged as to be readily cleaned in a few minutes in the event they become clogged. Ultimately they are sure to become clogged if they are not occasionally cleared, because of the formation in them of carbonate from carbon dioxide absorbed from the air.

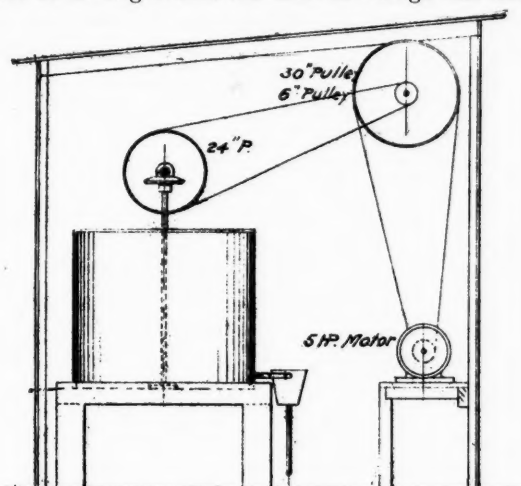
rotary stirrer does not produce nearly such thorough agitation and mixing of the solution of hypochlorite as the same stirrer can do in the hexagonal tank. The paste is mixed with water in the dilution tanks until a uniform solution of a strength of two per cent. occurs. The use of the two tanks makes it possible to accurately adjust the strength of the solution in one dilution tank while the contents of the other is being utilized. The dilution tanks are placed on supports high enough to permit the use of a gravity feed to the orifice box, which is placed on the floor of the room housing the big tanks.



ELEVATION OF TANKS.

PERMANENT HYPOCHLORITE PLANT, QUINDARO STATION, KANSAS CITY.

Bronze pipes, one and one-half inches in size, so arranged as to be readily cleaned in the event of stoppage, connect the dilution tanks with a gauging tank four feet in diameter. This gauging tank contains a float, scale and pointer so arranged that the man in charge can accurately

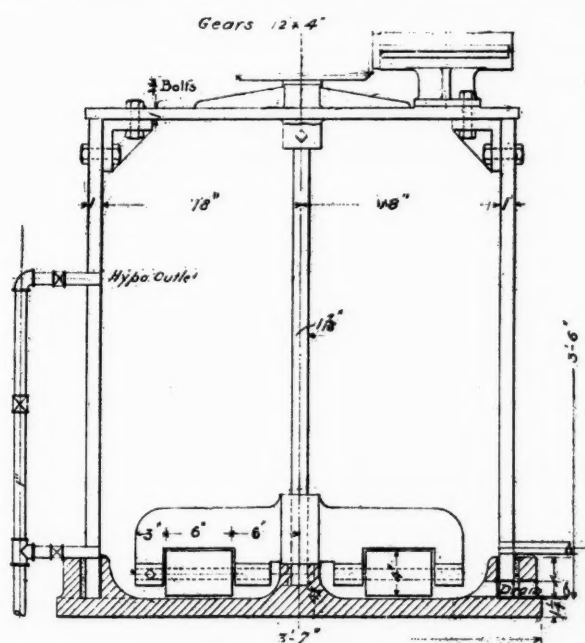


END SECTION.

KANSAS CITY.

check the speed of outflow of solution from his orifice box into the big water main carrying the entire city water supply from the setting basins to the pumps. The solution passes through the gauging tank to the orifice box. Each division on the gauge represents one gallon of the hypochlorite solution.

The orifice box is oblong in shape and carries a float of about 250 cubic inches displacement. The float operates a valve which, by either opening slightly or closing, maintains the hypochlorite solution in the orifice box at a constant level. One end of the orifice box is of plate glass to enable the operator to see at a glance that the solution is filling the box to the proper height. Attached to the plate glass and covering a hole in it is a hard rubber disc having near its periphery several slits, which permits the regulation of the size of the stream of the two per cent. hypochlorite solution to the proper amount to treat the quantity of water passing through the main. All movements of the hypochlorite solution after its preparation are by gravity. Ample opportunity for the hypochlorite, after its addition



HYP0 MIXER, QUINDARO STATION.

to the water, to react with any putrescible organic matter and germs is afforded during the time in which the water passes through the centrifugal pump, the flow line and a small storage basin at Turkey Creek before it is pumped to the domestic water users.

All of the stirring devices are run by an electric motor belted to a line shaft carrying clutches so placed as to make possible the running of any one of the stirrers whether or not any of the others are running.

We find that .30 to .50 parts per million available chlorine is necessary to sterilize, or about one-half part per million, or from 8 to 12½ pounds of hypochlorite per million gallons. This amount removes, under ordinary conditions, all B. coli and 99 per cent. of all germs. The cost is about 30 cents per million gallons for labor and material, not including interest and depreciation on plant. As the plant is not yet completed we are unable to arrive at this additional cost, but it will be small. The 30 cents cost for sterilization is based on a thirty million gallon consumption. When the consumption increases the cost is less than 30 cents per million gallons, so that it probably will not exceed that amount including interest and depreciation, as the pumpage during the hot and cold months averages over forty million gallons.

In view of the fact that a great many cases of typhoid fever are imported and that there are still open and being constantly used numerous springs, wells and cisterns known to be contaminated with sewage, the result has been all that could have been anticipated. During the year 1910 no specific attempt was made to destroy pathogenic germs in the municipal water supply. During the year 1911 the hypochlorite process was used throughout the year. The following tabulation, showing the number of deaths from typhoid fever month by month during those years, is illuminating:

DEATHS.		
Month.	1910.	1911.
January	17	6
February	21	6
March	10	4
April	8	3
May	3	4
June	7	1
July	9	5
August	8	6
September	6	3
October	6	8
November	4	6
December	8	9
Totals	107	61

Now, with this great source of danger from infection by the Municipal Water Supply removed, it is possible for the Health Commissioner to so enforce the abandonment of questionable sources of water supply and regulate sanitary conditions as to make the occurrence of typhoid fever and most intestinal diseases an uncommon thing in Kansas City.

The following are some germ counts on the city water supply showing the improvement of the water by the hypochlorite process:

GERMS IN ONE CUBIC CENTIMETER OF WATER.

Date.	Quindaro Missouri River before treatment.	Clear basin before treatment.	Hydrant at City Hall after treatment.	B. Coli after treatment.
March 20.....	10,000	1,200	75	0
March 21.....	8,000	1,800	70	0
March 23.....	4,000	800	100	0
March 24.....	10,000	500	55	0
March 25.....	8,000	600	90	0
March 27.....	8,000	400	25	0
March 28.....	5,000	260	20	0

WATER WORKS CONVENTION

Report of Meeting Held at Louisville, Ky.—Electrolysis— Water Softening and Chlorination—Water Waste—Experiences with Freezing

(Continued from page 905.)

Wednesday evening was spent at an amusement resort known as Fontaine Ferry, where the members and their friends were guests of the Water Works Manufacturers' Association.

On Thursday afternoon a luncheon was given by the Louisville Water Co. to the members and guests of the association, who were conducted by special trolley cars from the hotel to the filter plant, where the luncheon was served in an unused portion of the filter house, which has been reserved for duplicating the present filter plant when this becomes necessary. This was declared by all to be the most elaborate and complete affair of the kind which had ever been furnished for the society. The bare hall had been transformed into a banquet room by the abundant use of palms, boughs, flowers, hanging baskets of ferns and festooned bunting. Along the north end, across the entire width of the hall, was an impromptu sideboard, surmounted by a fac-simile of the office building of the Louisville Water Co., done in confectioner's sweets; while beneath it rested planked shad, salmon, whole hams, roast shoats, lobsters, etc.

In the evening a business session was opened by the reading of a paper by Prof. Albert F. Ganz, entitled "Electrolysis from Stray Railway Currents." This was a technical discussion of the subject, but couched in popular language so that it was easily understood by all; Professor Ganz dividing the subject into the several heads of definition of electrolysis, stray currents, general effect of stray currents, corrosion which is not due to electrolysis, damage done and danger from electrolysis, and remedial measures.

In brief, he stated that electrolysis produced no change in the case of metallic conduction, its only effect being to create heat; but in electrolytic conduction—that is, conduction through materials other than metals, this being generally through the soil in the cases under discussion—a chemical decomposition takes place, acid being created at the point where the current leaves the rail and metallic iron being dissolved by this acid. Generally speaking, alternating current does not cause electrolysis, although under exceptional conditions such a current may by induction set up a direct current which will cause damage. Professor Ganz stated emphatically that the only satisfactory solution for electrolysis was insulated return feeders; the double trolley being the best preventative. Draining a water or gas pipe by connecting it to the rail at the point of departure was in general only a temporary remedy, and actually increased some of the dangers from electrolysis since it tended to increase the flow of current in the pipe. In the Peoria decision the railway company was enjoined from permitting its stray currents to reach the mains; and return feeders was the only possible method of accomplishing this.

In discussing this paper A. A. Reimer stated that the drainage method was used in East Orange and he believed that it was a fairly satisfactory remedy. In that city occasional surveys are made to detect new damage points in order that bonds between pipe and rail may be placed there. Professor Ganz said, in comment on this, that it was not always possible to detect damage points in order to apply this remedy.

E. H. Breidenbach then described "Water Softening at Owensboro, Ky.," where a hard water has been served

by a municipal plant in competition with soft water furnished by a private plant, but the former found it necessary to soften the water in order to retain consumers. The plant which was constructed for this purpose was described, lantern slides being used in this connection.

On Friday morning the session opened with a paper by D. D. Jackson, entitled, "Results of Chlorination at Cleveland, O.," which was illustrated by lantern slides. This plant has been in use since September, 1911, in order to sterilize water pumped from the lake. This water, while taken from an intake some distance from the shore, is likely at any time to be polluted from either the sewage of the city or by lake steamers. The worst condition in this respect appeared to be occasioned by ice which had formed along the city front and was then blown into the lake by an off-shore wind. After one of these ice flows a slight rise in typhoid fever cases in the city was generally noticed, allowance being made for the incubation period. So considerable was the pollution, in fact, that typhoid germs were actually isolated from the water during these ice flows. At first 0.8 parts of chlorine were used per million. This amount was just on the verge of giving a taste and odor to the water, and at times variation in the pumping rate which was not immediately followed by variation in the rate of chlorine application caused a noticeable odor and taste. Experiments were made to determine whether a somewhat lower amount of chlorine would not give satisfactory sterilization, and as a result of these the dose was reduced to 0.5 parts per million, and no taste has since been noticed. The use of liquid chlorine was believed by Dr. Jackson to be preferable to hypochlorite in that it introduced nothing into the water except the active gas, and was almost identical with ozone treatment. It now costs 8c. a pound, which makes it twice as expensive as hypochlorite, but with any considerable increase in use the price will probably fall to 6c. As a partial offset to this, practically no plant is required for applying it. In tests conducted, liquid chlorine reduced *B. paratyphi* from one million to one per cc. in 15 minutes when applied at the rate of 0.6 parts per million, while hypochlorite in the same time, when applied at the rate of 0.7 parts, reduced the same bacteria from one million to one hundred, both at 66 degrees F. The effect of temperature was shown by the fact that at 34 degrees F. 30 minutes was required to obtain practically the same result.

Dr. Jackson devoted a considerable portion of the paper to arguments in support of the statement that in the majority of American cities not more than 10 per cent. of the typhoid cases are due to the water, 45 per cent. are due to unsanitary conditions, and 45 per cent. to contact. By means of numerous curves he showed that there is a general tendency to a fall rise in typhoid, which was especially prominent in southern cities, but was almost entirely eliminated in those where sanitary conditions were best. This rise was, in his opinion, due largely to flies combined with unsanitary conditions; while water-caused cases occur in the spring and cause a spring rise in the curve. These he said were typical, and an examination of the typhoid curve of any city on this basis would indicate whether the typhoid in that city was due mostly to the water supply or to unsanitary conditions.

Following this S. Y. High's paper describing "Hypochlorite Sterilization at Kansas City, Mo.," was read by the secretary in the absence of the author. The results obtained by this plant were stated to be the removal of 99 per cent. of all germs and of all the *B. coli* by the use of 0.3 to 0.5 parts per million of hypochlorite. In discussing this and the previous paper, Wm. F. Wilcox stated that he considered the spring and fall rises described by Dr. Jackson a very important point, in that a water works superintendent could tell without an expensive investigation whether the water supply was responsible for the

typhoid in this city, or whether the local board of health should be held responsible. A. Prescott Folwell questioned Dr. Jackson's statement that in the majority of American cities not more than 20 per cent. of cases of primary typhoid infection were due to water supply, citing figures given in the paper itself, showing that Cleveland reduced her typhoid rate by about 65 per cent. by changing the location of the intake, and that Chicago, Cincinnati and other cities had reduced their rates by 50 to 80 per cent. by improving the water supply. In replying to this Dr. Jackson stated that he had in mind the average large city, most of which have already improved their water supplies; this statement being applicable really only to cities where the supply was filtered or otherwise improved.

Geo. G. Kennedy stated that since the Harrisburg, Pa., water supply had been filtered a constant census of typhoid cases was kept and practically all of these had been traced to milk. Dr. J. L. Leal read a written discussion, in which he stated that the hypochlorite treatment was now in use continuously in 300 cities of the United States, and probably in 100 more occasionally. M. N. Baker, referring to Dr. Jackson's paper, emphasized the importance of the study of causes of typhoid fever by health departments, both local and State, in order that the proper precautions might be taken; and that when the causes had been learned the most effective remedies should be applied, whether this be filtering the water or abolishing privies and other unsanitary conditions. He proposed, and there was adopted by the society, the following resolution:

Resolved, That the American Water Works Association urges upon boards of health the importance of ascertaining and recording the distribution of typhoid fever by causes or modes of infection, to the end that a division of responsibility may be made between water supply, contact cases, general unsanitary conditions, milk and other food supplies liable to contamination and typhoid carriers;

And be it further resolved that boards of health be urged to do their full duty in the elimination of all causes of the spread of typhoid fever, including the use of polluted private wells, or other polluted water, when a pure public water supply is available.

W. W. DeBerard stated that an investigation of the matter of taste and odor due to hypochlorite treatment had apparently shown that in certain waters, at least, this taste became quite pronounced where the hypochlorite treatment was preceded by lime and iron coagulation, but that there was no taste whatever when alum was used as the coagulant.

Edward S. Cole then read a paper entitled, "The Cost of Water, Or Is It Worth While to Stop Waste," in which he dealt with the question of waste of water by American cities, and made a plea for a more intelligent classification of consumption figures so as to show the amount used by manufacturing and business establishments as distinguished from residences. In discussing this paper T. C. Phillips stated that in Chicago, after the plumbing of a district had been put in shape by careful inspection, 30 per cent. of the consumption was underground leakage and wilful waste. A. A. Reimer stated that in East Orange the water department inspects the plumbing regularly, although 25 per cent. of the services are metered, and this is quite effective in keeping down waste. In accordance with the recommendation of Mr. Cole in his paper, it was voted to appoint a Committee on Water Consumption, with the idea of having the water works departments and companies throughout the country adopt the separate reporting of residence and manufacturing consumption. It was also voted to appoint a Committee on Tabulation, with the object of obtaining, with the assistance of the secretary, data concerning water rates in the various cities, as well as other information of general interest, tabulating the same and furnishing it to the members of the society; the possibility of obtaining this being held out as an additional inducement in obtaining members to the association.

The "Method and Cost of Locating, Measuring and Repairing Leaks in the Distribution System of Lancaster, Pa.," was then read by F. H. Shaw. This paper appears elsewhere in this issue. It was discussed briefly by R. J. Thomas, T. C. Philips, John A. Kienle, Geo. C. Kennedy and A. A. Reimer.

The report of the Committee on Electrolysis was presented by Dabney H. Maury, the principle feature of this being a synopsis of the Peoria decision. Mr. Maury also reported as chairman of the Committee on Revision of the Constitution, stating that a rough draft had been prepared, but the committee did not wish to make a final report until more careful consideration had been had of this. The committee was continued and instructed to follow out its suggestion of submitting the revision to the Executive Committee and then, when approved by this committee, that it be sent to the members in advance of next year's convention in order that the entire membership of the society could give it careful consideration before acting upon it.

The election of four additional new members terminated this session.

Friday afternoon found a number of papers yet unread and other unfinished business, and this session opened with a paper by Chester G. Wigley, "To What Degree Must Sewage Be Purified," in which he outlined the general methods of sewage purification and the selection which should be made according to the body of water which must receive the effluent. M. N. Baker expressed his opinion that State boards of health in too many cases took too narrow a view of the subject and endeavored to enforce requirements as to sewage pollution unnecessarily severe in some cases. A. Maclean gave an interesting description of the rapid growth of Edmonton, Alberta, which led to the growth of the water works from 107 services in 1903 to 2,520 in 1908 and 4,736 in 1911. The consumption increased so rapidly that it has been necessary to install a new pump about every two years. Owing to the cold climate, mains are laid with 8 ft. cover, the frost reaching to a depth of 7 ft. 6 in. During last winter from 10 to 20 services a day were thawed out by the water department. Discussion on this paper drifted into a comparison of experiences with lead and galvanized iron service pipes. Among others J. H. Fewell said that in Jackson, Miss., lead services were run to the curb at every lot before paving, and no trouble with these had ever been experienced. Several other members related instances of galvanized iron services rapidly deteriorating, generally by electrolysis, while lead services remained intact. On the other hand one member stated that lead services had been destroyed by electrolysis in about one-half the time required by galvanized iron. In Phoenix, Ariz., according to V. A. Thompson, when such a condition was discovered the services were laid in fibre conduits as a preventative of electrolysis.

E. E. Davis stated that lead pipes laid in Richmond, Va., in 1853 are still in good condition, while galvanized iron services went to pieces in 15 years.

As the time for adjournment was approaching, it was decided to read by titles only the remaining papers entitled, "Ice Troubles at Buffalo, N. Y.," by Henry W. Lyon; "A Method of Increasing the Depth of a Large Wooden Settling Tank," by A. H. Meyers; "A Reliable Quantative Test for B. Coli," by Shepperd T. Powell; and "Wood Stave Water Conduit at Atlantic City, N. J." by L. Van Gilder.

In the few remaining minutes questions in the question box concerning freezing were briefly discussed, among the experiences recited being the following: In Minneapolis last winter the frost extended to a depth of 9 feet, and every hydrant was examined each day, with the result that all were in serviceable condition when needed. At Edmonton hydrants with compression valves have proved

every troublesome and positive drip, slide gate hydrants are now used, with the drip connected to the sewer. During the winter all hydrants were tested every day. J. M. Diven stated that at Elmira, N. Y., nine years ago, some trouble was experienced with certain hydrants freezing and these were packed at the bottom with manure, which was so effective that warm water could be drawn from the hydrants; and he had learned that these same hydrants did not freeze during the extreme weather of last winter, although nothing additional had been done to them during the nine years. One member used salt water in hydrant barrels, but another found four to six inches depth of crude oil poured into the barrel was better, as he had found that salt water corroded the metal around the valve and choked the drip. In one city less trouble had been found from freezing services where they were in rock excavation than where in dirt.

In discussing question No. 29, relative to the effect of local water works associations on the American Association, Prof. Bartow suggested that the local societies be taken in as local sections of the American society (with their consent) and that other local sections be established, as he found these local sections to be of special service to the superintendent of the small plant, and also because many water works questions were to a large extent local in their nature. He also suggested that what he termed national sections be organized, with a view to holding separate meetings at the annual conventions, one devoted to each section; as water purification and analysis in one section, pumping plants in another section, general maintenance in a third, etc. Theo. A. Leisen, member of the committee on Revision of the Constitution, stated that that committee had already considered and would probably recommend these points in connection with the revision, and Prof. Bartow moved that, in order to save time, the Executive Committee be instructed to open negotiations with local water works organizations with a view to forming local sections of this association in case this idea was adopted by the American Water Works Association at its next convention.

A member expressed a desire to learn of the experience which had been had by the other members with indicators as a means of measuring the water used by hydraulic elevators. There were none to defend this practice, but a number of members cited illustrations in their own experience to demonstrate its undesirability. One stated that on applying a meter to elevator services which had previously been paid for by indicators, the water bills immediately were increased from 2 to 20 fold; and similar experiences were given by other members. A number believed that elevator and all water motor services should be discouraged, and that if the water was metered and paid for it would be found that electric motors would be cheaper. It was also recommended that no such service larger than two or three inches should be permitted.

One member, in breaking out large pipe, such as 32-inch to 48-inch, which had been found cracked or which it was for other reasons desired to remove, had used dynamite very effectively, a small piece of a dynamite cartridge being placed on top of the pipe, covered with a little mud and exploded. A few such shots were sufficient to break a pipe which had defied the efforts of the strongest laborer with a 20-pound sledge.

After adopting resolution of thanks to the Louisville Water Company, the street railway company and other individuals and bodies of the city who had furnished entertainment to the association, the convention adjourned. About thirty members were present at this last session, and the maximum attendance at any session probably reached about 175. On Saturday morning at 8 o'clock about 150 left for Mammoth Cave in a special train, furnished by the United States Cast Iron Pipe and Foundry Co., returning

the same evening in another special train; this concluding the social events of the convention week.

The exhibition given by the members of the Water Works Manufacturers' Association was more than usually attractive, and is described elsewhere in this issue. About fifty firms were represented, most of them by samples or models of their goods. Only a few of these possessed novelty to the older members; but there are always present some new members and others who have not attended a convention and seen these exhibits for a number of years.

These exhibits occupied a large, well-lighted room. The audience hall had seating capacity for only two hundred, and some of the members expressed the hope that at future conventions the space devoted to the exhibits would not be allowed to restrict quite so much that allotted to the business meetings.

VALUATION OF WATER WORKS

Cost of Reproduction—Value of Plant Site—Distribution System—Adequateness of Plant—Depreciation—Value

By ALTON D. ADAMS.

Wide differences of opinion often exist as to the value of a water works that is to be acquired by a city. Beside the value of the physical plant there is usually a going or business value to be considered in such a transfer.

Unlike the rule where property devoted to private use is taken under the power of eminent domain, the going value of the business connected with public service plants must often be paid for when such plants are taken by municipalities. Obligation to pay for such going value is, however, largely a matter regulated by the statutes, ordinances or franchises relating to each particular case.

In the purchase or taking of a water works, the value at the time of said purchase or taking, rather than the original cost, is generally the figure sought, and this as to the physical property is to be arrived at by estimating the cost of reproduction at the then price of labor and materials and deducting therefrom the estimated depreciation.

Cost of labor and materials should be based on what would have to be paid for them in the construction of a water works at and about the time of the taking or purchase of the existing plant and current prices during one or more months previous to such purchase are usually the best measure of such payments, as it might be unfair to either the seller or purchaser to base the estimated cost of reproduction on the prices of a single day.

On the other hand, it will often be very unfair to either the seller or purchaser to take an average of prices for materials over a period of five, ten or twenty years, as has been done in some valuations.

Obviously the cost of constructing a water works at a given date would not be at all influenced by the price of materials ten or twenty years before that time and the willing purchaser of a water works on a given day could not be expected to regulate his offer by the cost of materials many years before.

So, again, the estimate of the reproductive cost of a water works should properly be based on its construction as a single continuous piece of work and not what it would cost to build such a work in small parts from time to time over a long series of years, though this latter method has, of course, been actually followed as to many existing works that have been extended as required.

While the cost of reproduction of the various equipment of the water works is usually to be estimated, this is not always so, because there are instances where mere inspection of some of the equipment shows that no well advised purchaser would ever think of reproducing it or anything like it.

An illustration in point is the early types of pumping engines that have now been generally discarded for more efficient machines.

A situation sometimes found in the valuation of water works is the use of a parcel of land, very valuable in itself, for the purpose of the plant, though a much less valuable tract would answer every purpose equally well. Such a situation usually arises, if at all, where there has been a considerable growth of a community since the installation of the original water works and a consequent rise in land values.

Where land much more valuable than is necessary is thus used for the purpose of a water works, it should be valued at no more than the cost of equally good land for like use. An erroneous method of valuation sometimes followed in this connection is to take a figure for the land representing its highest value for any purpose and then add to this figure the cost of the pumping plant or other water works equipment that may be located thereon. This method violates the principle that the sum of the values of the parts of anything cannot be greater than the value of the whole.

The whole or total value of a pumping plant, for instance, is obviously no greater than the fair cost of suitable land for the purpose plus the cost of erecting the buildings and equipment thereon.

A striking illustration of the principle just stated appeared in one case where the land for use in connection with the buildings and machinery thereon was held by the court to have a value of only \$15,000 though this same land if stripped of all buildings and machinery was worth in the market as a site for retail stores, \$150,000. To realize this \$150,000 for the land, however, it was necessary to destroy buildings and machinery of a much greater value, and land suitable for the location of such buildings and machinery could be had at a cost of \$15,000. The land occupied by the existing buildings and machinery was thus worth only \$15,000 for that purpose, though it could be sold for \$150,000 with the buildings and machinery removed.

Taking the cost of water works as a whole, it is not generally possible to make very close comparisons one with another because of the great differences that exists in types of plant and quality of equipment, but instructive comparisons can sometimes be made between plants quite similar in these respects.

For plants of about the same annual capacity, for instance, great differences of cost will exist between those designed for direct pumping and those intended for a purely gravity supply. So, again, in the matter of pumping equipment alone, the types that operate with the highest efficiency and lowest repair bills cost several times as much as equipment of a much shorter life and larger fuel consumption per million gallons of water delivered. As between slow and rapid sand filters the former require a much larger investment and their annual expense of operation is decidedly less. Even with the rapid or pressure filters quite different volumes of water may be handled, depending on the head employed.

In the distributing system of pipes, valves and hydrants, large differences will be found to exist according to the weight of pipe employed and the sizes, numbers and quality of the hydrants and valves.

Some years ago it was common to lay much thinner and lighter cast iron water pipe than is now used for the best class of work, and this fact alone makes a material difference in the value of the pipe system.

Stop valves have been used much more plentifully in some pipe systems than in others. The larger investment in valves often represents an increased value in security and convenience as well as in the valves themselves. At one time it was common to install fire hydrants with small-

er valve openings than have since been found desirable and even without as complete bronze fittings as are now generally required, and the value of these earlier hydrants cannot, of course, be taken equally with that of the improved hydrants of the present day.

Between the north and the south the differences in the depths to which water pipe are laid amount to as much as three feet, and this, of course, means a very substantial difference of investment for labor in laying the pipe system.

Another important factor bearing on the first cost and consequent value of a pipe system is the character of the soil in which the trenches are dug which may, of course, vary all the way from rock to an easily handled gravel or loam.

In the matter of services both wrought iron and lead pipe have been extensively used at substantial difference in first cost, and such differences are also found in the number and character of the fittings installed with the service pipes. In some water works the rule has been to make water takers pay for all parts of the service pipe excepting the corporation cock at the main, while in other places the services have been installed free of cost to consumers clear up to the meter.

The meters themselves, like other parts of water works equipment, vary largely in first cost according to the make and type, and some water works own all of the meters in use, while in others they are owned entirely by the water takers.

Having estimated the reproductive cost of a water works on the basis of current prices the equally important and more intricate problem remains of determining how much this cost must be reduced by depreciation to arrive at the present value. A variety of causes contribute to the depreciation of water works and may at any particular time have destroyed much or all of the value of some parts of the equipment.

In some cases it is unnecessary to estimate the cost of reproduction of certain parts of a plant at all because it is evident that there is no reason for reproducing them. Such an instance occurred recently in the valuation of a large water works that draws its supply from one of the Great Lakes. A number of years ago a large intake crib and pipe had been built to draw water from the lake, but had since proved to be quite inadequate in capacity, and the crib was located so near the shore that the quality of the water obtained long ago ceased to be satisfactory. This crib and intake pipe though probably in sound physical condition was entirely omitted from the valuation because it was obvious that it could no longer be used to any extent for the original purpose.

In another instance a group of artesian wells that had cost a large sum to drill and equip were omitted from the valuation of a water works because these wells, though still owned by the water company, had been abandoned for a more satisfactory source of supply.

An entire pumping station in one system lost most of its value because the service source of supply with which it was connected had come to be quite inadequate for the growing needs of a city and a new pumping station was necessarily erected in connection with another and much larger source of supply.

Depreciation of value in equipment because growing demands have left its capacity too small for present purposes is very common in all parts of water works from the reservoirs or intakes to the mains. Such results have been repeatedly reached along the shores of the Great Lakes where intake pipes, once thought to be ample in capacity, have had to be repeatedly supplemented with those of larger size so that the original pipe, even where it has remained in use, falls to a value far below its cost of reproduction because equal capacity can be obtained much

more cheaply by increase in the larger pipe that must be installed.

In water distributing systems three and four-inch pipes that were once large enough have often proved inadequate for the increased demands of water takers, and especially for the supply of fire hydrants.

Pumping engines have been rapidly displaced for lack of capacity though in sound physical condition because the space that they required could be much better devoted to larger units.

Another, though not so common a sort of depreciation, is that which attaches to the parts of a water works that are much too large for present purposes. In one instance a Court of Equity for the purpose of fixing a valuation as the basis of reasonable rates, found it necessary to deduct \$75,000 from the cost of a 36-inch main, \$30,000 from the cost of a dam and \$25,000 from the cost of a reservoir because these parts of the system were much too large for the immediate needs of water takers or any demands in the near future.

Again, in a case before the Supreme Court of the United States, where the question of the reasonableness of rates fixed for water service was in question, it was held that the entire investment in a system much too large for the then number of water takers was not entitled to earn what would otherwise be a reasonable return.

With the doubled efficiency of pumping engines during the past thirty years it has been often necessary to replace machines that were in sound operating condition with others of improved type simply for the purpose of saving labor and fuel so that the advance in the art itself has been an important factor in the depreciation of such engines. With the pumping engines of higher economy it has been necessary to increase the steam pressure up to about 175 pounds per square inch, and this increase has displaced many steam boilers that were capable of years of use at the former pressures of 100 pounds or thereabouts.

Two sorts of depreciation met especially in the pipe systems of water works are electrolysis and incrustation.

Electrolysis operates to destroy parts of the piping system by actually carrying away the metallic irons, so as to riddle the pipe with holes at certain points and lead to serious leaks and breaks. Owing to the laws that govern the flow of electric currents, electrolysis of water pipes is usually concentrated at certain points in the distributing system in large part. Whether any electrolysis has taken place is usually a matter that can only be determined by a special investigation unless the damage had gone so far as to produce large leaks and ruptures of the pipes.

Incrustation of pipes depreciates their value by partially filling up the interior so as to greatly reduce in some instances the carrying capacity and thus cut down the rate at which water can be delivered to hydrants or private services. Such incrustation can be removed from the pipes at greater or less expense, according to the design of the system, by breaking into it and running scrapers through that remove the hard materials adhering to the inner walls of the pipes. Such scraping of the pipes may be quite an expensive matter, so that the necessity for it represents a considerable depreciation in value.

A most serious, though fortunately rather unusual, source of depreciation in water works arises where duplicate plants are installed to supply the same city or territory with pipes running through the same streets. In such a case the amount of the depreciation is apt to be a large part of the reproductive cost of the duplicate or competing water works and can only be determined by a careful investigation into the circumstances of each case. In a valuation of two duplicate and competing water works recently it was found that the value of each was reduced by the situation much below the cost of the reproduction.

Apart from the sorts of depreciation above considered, is that of physical wear and decay due to age and use which necessarily affects all engineering structures.

Every sort of water works equipment is limited in its life, be it long or short, by such wear and decay, and experience is, of course, the best teacher as to the actual duration of life that need be expected of each kind of equipment. The duration of life for a particular part of the plant being once fixed, there is obviously a constant loss of value as its age increases. It follows that an old piece of equipment, though in perfect working condition, cannot be as valuable as a new piece of the same type and capacity because a part of the service that the old equipment was originally capable of rendering has been consumed.

The value of a building or a piece of water works machinery obviously depends on its usefulness for some particular purpose and on the length of time during which that usefulness may be enjoyed.

The fairest method of applying physical depreciation is consequently to allow a pro rata loss of value from the reproductive cost in proportion to the age of the structure. Thus, if a new machine is capable of rendering good service during fifty years and costs \$1,000, its value as far as wear and decay are concerned should be \$500 at the end of twenty-five years of use.

The propositions just stated being true, it is obvious that the claim sometimes made that an old building or piece of equipment is "just as good as new" is an error and can really mean only that the structure in question operates just as well or is just as useful as ever.

The crucial fact remains, however, that the time during which the use or operation of the structure may be enjoyed has been reduced to the extent of its elapsed life and consequently a corresponding proportion of its original value has gone out of it.

The going value of a water supply business may be estimated as the cost of acquiring an equal volume of business at reasonable rates without competition and under present conditions. Important among these conditions are the habit and desire of the people generally to use water from a public supply, the common ownership of plumbing fixtures that require water under pressure for their operation and the impure quality and insufficient quantity of water from private wells and systems.

Obviously the cost of acquiring a given volume of water supply business depends to a large extent on time during which a new plant must be operated to reach that result, and much of the difference in estimates of going value turn on this point. These differences in estimates of going value vary all the way from nothing to a sum greater than the physical value of a given water works.

In one instance recently it was estimated that ten years would be required for a new water works to obtain a business equal to that of the existing works, and on this basis a very large figure for the going value was reached.

On the other hand, it is known that certain new water works have secured business very rapidly in recent years in cities where there was no competition. A case in point is that of a new water works in one of the large cities of the United States, where the number of services in use increased from 1,500 to 29,000 during three and one-quarter years. Quite a number of instances are on record where new water works in recent years have secured consumers and business very rapidly.

The cost of reproduction for the physical plant less depreciation and plus the estimated going value sometimes gives a total estimated value far above what the earnings of the water works in question can provide a reasonable return on, and yet some experts counted that a city should pay such estimated value even though a private purchaser should not.

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JUNE 20, 1912.

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Water Works Records and Reports

It seems to be the opinion of quite a number of water works officials that there is no practical value in keeping a record of the physical properties of the company or department or of the consumption, or a system of cost accounting. We could name several companies as well as municipal departments which cannot tell how much pipe they have under the ground, or where, or of what size; how many valve gates, or where they are located; how many fire hydrants, or even how many service connections; how many gallons were pumped last year; how much coal was used; in fact, which have no definite knowledge concerning the plant except the total income and total expenditure—and cannot prove these. And they are contented with this lack of knowledge. Why go to the trouble and expense of keeping such records? they ask.

Assume the consumption grows, and consequent falling pressure in the mains makes larger or duplicate ones apparently necessary. It may be the falling pressure is due to main leakage or waste, but your recordless man has nothing to indicate this, and spends money on new mains when a fraction of the amount would have made them unnecessary, besides reducing pumping costs. If it is decided to lay the mains, the money spent in digging to learn just where the old mains lie, their depth and size, the nature of

the special castings at intersections, etc., will amount to several times what it would have cost to keep the records of these when they were laid.

If pumping is required, it can ordinarily be known whether the engineer is efficient; the coal good, actually delivered as ordered, and used; the pump slip 4 or 40 per cent., only if a record is kept of the amount of water used. If it is a gravity plant, records of rainfall and run-off on the water shed and of total consumption will render it possible to foresee a shortage in supply several years ahead; but the man who has not kept and intelligently used such records some year finds himself in the awkward position of having to explain a water famine which has no explanation but inexcusable carelessness.

These are only a few offhand suggestions of how reliable records may prove of practical value. The right of stockholders and taxpayers to know all the details of operation is sufficient argument for clear and full reports giving these facts, even though there were no other for either the report or the record on which it is based. Advantages of standard forms for such reports are given elsewhere in this issue.

The Peoria Electrolysis Decree

WE present herewith the "Peoria decree" which was submitted by the Committee on Electrolysis of the American Water Works Association as the main feature of its report this year, and which is generally considered to be the most important court decision on the matter of electrolytic destruction of pipes which has been made in recent years.

Peoria Waterworks Company vs. Peoria Railway Company; equity for injunction and relief.

Special master findings of fact and conclusions of law filed April 13, 1901. Further evidence and report filed by some master in chancery after exceptions of defendant to first report on June 22, 1909. The court found at that time and decided that the complainant's water works system had been and is being damaged by electrolysis caused by electricity generated by the defendant, and that complainant cannot prevent such injury; that defendant shall take such measures within a reasonable time, as to practically and substantially prevent further injury from electrolysis and that complainant company operate with defendant to prevent or lessen the escape of electricity from the rails and from the water pipes in such a manner as to cause injury thereto.

1. It is thereupon adjudged and decreed as follows: The defendant Peoria Railway Company and its officers, agents and servants after one year from and after the date of this decree, are enjoined and restrained from injuring the water pipes, service pipes, hydrants and all other structures and property of complainant, Peoria Water Works Company, through or by the escape of electric current from the rails or structures or property of the defendant.

2. It is further adjudged and decreed that the complainant, Peoria Water Works Company, its officers, agents and servants, shall permit defendant, its officers, servants and agents at their own expense at all reasonable times hereafter upon written request therefor, and within a reasonable time after such request, to inspect its water mains, service pipes and hydrants, in order to determine whether injury from electrolysis is being continued, the extent of the same, the flow of the electric current upon piping systems and the extent thereof, and such other matters as may be necessary in order to determine whether defendant is complying with the terms of this decree.

3. It is further adjudged and decreed that the findings of the special master, so far as inconsistent with this decree, are overruled, and otherwise sustained and confirmed.

4. It is further adjudged and decreed that the court retains jurisdiction of this cause for the purpose of enforcing by appropriate orders herein, as occasion may arise or in such manner as it may determine, the terms of this decree, and either party may at any time apply to the court for such further orders or directions in harmony with this decree as it may be advised is material.

5. Within six months after the expiration of one year after the date of this decree, defendant may in its discretion apply to the court, on notice to complainant, for a hearing on the question whether an order should be made for directing complainant to permit defendant to make experimental use of the "drainage system," so-called, by connecting with copper wire

the rails of the defendant, or some designated portion of its rail system, with the complainant's piping system or some designated portion thereof, in order to ascertain whether such drainage system or limited use thereof can practically be applied to said rail and piping system.

6. It is further adjudged and decreed that neither party have costs as against the other in this cause, and that each party shall pay one-half of the clerk's, marshal's and master's fees, and that the fees and expenses of witnesses, experts and engineers, and for examinations and tests, shall be borne by party calling witness or requesting the service.

MAKING A LEAKAGE SURVEY

Water Meters, Fire Hose and Wrought Iron Pipe Used— No Special Apparatus or Street Excavation— Cost and Results

By F. H. SHAW, Engineer and Superintendent, Lancaster Water Department.

THE city of Lancaster, Pa., has a population of about 50,000 and an area of four square miles, about three of which are built up, giving a population of about 25 per acre. The city is supplied with water by a municipal plant, the first construction dating back to 1836.

The water is taken from the Conestoga creek, is filtered and pumped into the city against a head of 250 feet. The distribution system is connected with the pumping station by two force mains, one 30-inch and one 36-inch, each being about one mile in length.

The distribution system is divided into high and low service districts. The low service district contains about 0.4 of a square mile and is supplied from the old reservoirs constructed in 1836 and in 1850, which have a capacity of 6 million gallons. These reservoirs are filled at night by pumping through the 36-inch main. The high service district is supplied through the 30-inch main by direct pumping, the water passing through a standpipe having a capacity of 400,000 gallons, located on the reservoir grounds.

The distribution system consists of 70 miles of pipe varying in size from 24 inch to 4 inch. The system has been extended outside the city limits by various small water companies, their supply mains being metered at the city line.

There are about 10,500 services in use, one-third of which are metered. All large consumers are metered and meters are being installed at the rate of about 400 per year, all new properties being metered. The schedule rate for a three-story house having bath, two closets and pave wash is \$17. The meter rate is 5 cents per thousand gallons, with a minimum of \$10.

The daily consumption averages about 7 million gallons, varying between 5 million and 10 million, with a maximum pumping rate as high as 12 millions for short periods. Assuming a population of 50,000, this will give a per capita consumption of 140 gallons daily.

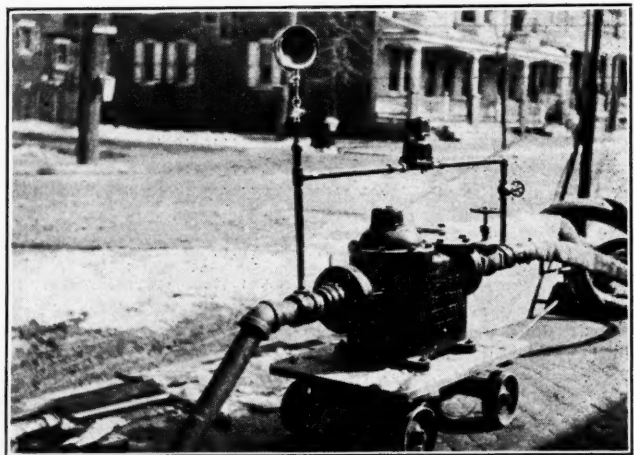
This excessive consumption led to an investigation of the causes and methods for correcting it. A general house to house inspection was made during the winter of 1910, at which time all plumbing was inspected for leakage. The results of this inspection were recorded on a card for each property inspected. As a result of this inspection, the yearly income from water rents was increased \$3,500. The city was then divided into four districts and a regular inspector appointed for each district. A yearly inspection is made of each house and property owners are compelled to repair all leaky fixtures within 10 days, 480 cases being reported and repaired during the last year. During these investigations the necessity of a systematic search for leakage from mains became apparent, and the discovery by accident of a leak which was costing the city about \$10,000 per year brought the matter to a head and the necessary appropriation was made. A survey party was organized from employees of the water department, a foreman who had been in the department for 20 years being placed in

charge of the work. The party worked 9 hours per day and was composed as follows:

ORGANIZATION.	
Foreman	per day \$3.00
Single team and working driver.....	" 2.50
Three laborers at \$1.80 per day.....	5.40
Total cost per day.....	\$10.90

OUTFIT.
One 4-inch meter with 2½-inch connections on truck.
One ⅝-inch meter.
One pressure gauge.
Two 25-foot lengths 2½-inch fire hose.
Two hundred and fifty feet 2½-inch galvanized pipe.
One small tool box.
Picks, shovels, wrenches, caulking tools, lead wool, etc.

The first step in preparing for this work was an inspection of all valves and repairs to same, placing them in working order and replacing some which could not be operated. This work was done by the men in the distribution department in advance of the survey. The survey was started in March 6, 1911, and stopped for the winter on December 13. The method of procedure was as follows: The four-inch meter was mounted on a small four-wheeled truck and the connections bushed down to 2½ inches, with a 2½-inch valve at inlet and outlet. The large meter was by-passed by a ⅝-inch meter for use on small flows. A pressure gauge was attached to the outlet end of the large meter.



FOUR-INCH AND ⅝-INCH METER CONNECTED UP.

The districts tested had an average area of 12 acres, containing about 80 houses. While being tested a district was shut off from the remainder of the system by closing all valves on street mains. The meter was then connected with a hydrant outside the district by means of a 25-foot length of fire hose. The 2½-inch pipe line was laid from the meter to a hydrant inside the district, being connected with it by another short length of hose. The consumption of the district was then measured for one hour, readings being taken every ten minutes and any reductions in pressure noted. Any considerable drop in pressure indicates either a large leak or that the district is too large to be supplied through 2½-inch pipe. After the consumption had been measured all connections were shut off inside the houses, an inspection of house plumbing being made at the same time. A test was then made to determine whether any street valves were leaking water into the district by opening a fire hydrant and watching for any flow from the opening. After everything was shut off the leakage was measured by the large or small meter, according to the amount. This flow, if any, represented the leakage from mains and also from services. To locate the leaks, the streets inside the districts were cut out one at a time by closing the valves until the leak had been located between two valves, after which it was located by using the audiophone on curb stops, hydrants and on drills driven down

to the main. After the leak had been definitely located it was dug up and repaired by the survey party and the district tested until found tight. The work was carried on for 240 days at a cost of about \$11 per day, or \$2,640 for the season for labor. The cost of lead wool, etc., for repairing leaks was very small. One hundred and eleven districts were tested, having a total area of 1,310 acres, or 12 acres per district. There were approximately 9,000 houses in the territory covered. The leaks discovered and repaired may be classified as follows:

Residences:	
Closets	20
Yard hydrants	10
Faucets	19
Service mains	17
	— 66
In streets:	
Street valves	12
Fire hydrants	35
Street mains	29
	— 76

Total 142 leaks.

The leaks varied from one to 19 cu. ft. per minute. The largest leak found was a three-inch elbow split wide open and running at the rate of 205,200 gallons per day. This line had been by-passed around the meter on a service connection and was supplying four buildings. In this case the survey not only stopped the leak, but detected the illegal use of water. This leak amounted to 75,000,000 gallons per year, the actual cost of furnishing which was \$2,812.50, or \$172.50 more than the cost of the entire survey.

The total mileage of mains inspected was 40.8, varying in size from 4-inch to 24-inch. The total leakage record was 118 cu. ft. per minute, or 1,271,000 gallons per day. Using \$37.50 per million as the actual cost of furnishing water exclusive of interest, the total leakage was costing the city about \$17,000 per year.

About one-quarter of the system remains to be tested; also the 20-inch supply main, which runs directly across the city. Work is now in progress on this section. One mile of 36-inch force main laid in 1888 was tested by closing the valves at both ends, and supplying it from the other force main through a small meter. Leakage was found amounting to \$2,000 per year. The joints on this main will be dug up and re-caulked during the present season.

The results of the leakage survey were not as pronounced as had been expected for two reasons, one of which was the exceedingly dry summer and the failure to provide for street sprinkling by wagons, causing a great increase in the use of individual hose sprinklers. Another reason was the exceedingly cold weather during the winter, which caused an excessive use of water to prevent freezing and also damaged many service mains, all of which probably have not been discovered. After the present survey has been completed, some of the districts will be retested to ascertain the damage caused during the past winter.

A comparison of the consumption before and after the survey shows a decrease of 10 million per month during March and April, equal consumption from May to September, a decrease of 8 million per month during October and November, a decrease of 24 million during December and an increase of 20 million during January, February and March. The present consumption is about equal to that before the survey began, while the consumption for 1911 is slightly less than for 1910.

I consider the decrease of 24 million per month shown in December a fair indication of the results of the survey, as abnormal conditions existed before and after this time which had a tendency to increase the consumption.

As an investment I believe a survey of this kind, which not only locates but repairs leaks, is a good one and well worth following up until it has been ascertained that the distribution system is reasonably tight.

STANDARD WATER WORKS FORMS

Why They Are Not More Generally Used—What They Should Aim At—Simplicity and Publicity Necessary for Their Adoption

TWENTY-SEVEN years ago the New England Water Works Association adopted a standard form for reporting water works statistics, with the idea that the use of this by water departments and companies would greatly facilitate comparison of the actual results obtained in operation, as well as of the physical characteristics of the plants. This form has been adopted by a few plants, most of them in New England, and the annual reports of these, tabulated in this form, have been published annually for a number of years in the *Journal* of the society. In 1902 the form was somewhat modified. Three or four years ago it was adopted, with a few additions, by the American Water Works Association. A year or two previous it had been endorsed and adopted by the American Society of Municipal Improvements.

These societies included in their membership the majority of those water works officials of the country who had affiliated themselves with any society; and yet we believe that at the present day less than seventy-five water departments and companies use this form; nor has the number ever been larger than this, for few if any which have once adopted it have later abandoned it. It is a matter of the greatest interest, in connection with the present agitation for standard forms in municipal accounts and for physical records and cost accounting, to learn why this or some other form has not been more generally adopted; since the answer may furnish valuable suggestions concerning the methods to be used—or not to be used—for promoting the use of this or of some better form.

At its 1911 convention the American Society of Municipal Improvements made provision for a study of the subject of standard forms for municipal departments, with a view to the preparation and adoption of such forms. This investigation is now under way. For the reasons just stated it seemed best to begin with an investigation of why the forms already advocated have not been more generally used; and whether water works and other municipal officials were in favor of the general use of any standard forms. Circular letters were sent to several hundred superintendents of water works, asking their opinions on these points, and replies have been received from 163 of them, with additional ones still straggling in. All but seven States of the Union are represented in these replies.

An inspection of the replies indicates two things very clearly—that the great majority of superintendents believe a standard form would be very desirable; and that an even greater number had never heard of the standard form of the New England or American Water Works Association; or if they had, had forgotten about it. Sixty per cent. stated definitely that they had never heard of the form (19 per cent. of the New England replies coming under this head); while 20 per cent. gave this impression without definitely stating so. And only 15 reported using the form.

This latter discovery greatly surprised the writer, considering the hundreds of members belonging to the societies which had adopted it. And these two items of information unquestionably furnished by the investigation seem to indicate that the adoption of uniform forms by any considerable number of cities cannot be secured without the most general and continuous publicity.

The word *continuous* is used, because of the unfortunately too general practise of frequently changing the superintendents and other officials of municipal departments, and every year scores of new ones, comparatively ignorant of the matters of which they are placed in charge, need to be informed.

Such publicity, even combined with a belief by superintendents generally in the desirability of a standard form, will, of course, effect the desired result only if the form proposed meets with general approval; and the preparation of a form which will be fairly acceptable to all is a difficult matter. We doubt if any one or two men can evolve such, no matter how comprehensive their experience or how broad their appreciation of local and personal inclinations, without the actual co-operation of well informed men representing many kinds of practice, sizes of cities and geographical locations.

The most encouraging return from the canvas was the general agreement in the idea that standard forms are desirable. Only two saw no use in such standards; about twenty were only mildly enthusiastic, and a considerable percentage were emphatic in their belief in the desirability of standard forms. A few typical replies to the question "*Would the general use by water works officials of standard forms of any kind be of service?*" are as follows:

It would tend toward standardizing and simplifying the work; would place before each member, whether large or small plant, the best practice in waterworks operation.

Undoubtedly, as it is by comparison that we learn things.

It would be of much use to see what we are accomplishing compared with other cities.

It would seem as if it would benefit all, unless there is so much detail that small stations are not equipped to furnish the information necessary.

Yes. For when a statement is made of cost, leakage, pump slip, income, consumers per mile, etc., all could be placed on the same basis, and you would know how you compared with other plants.

Yes. A correct form would not only allow of comparisons, but a thorough analysis of the individual plant would be more easily made by using one of these comprehensive systems.

I do not believe results could be obtained by using one standard form, because the conditions in each plant are different. * * * It is hard to compare a filtering plant with one that does not filter its water. * * * From the average data obtainable it is quite impossible to compare plants using steam, gas, oil or electricity for the prime mover. However, I believe a uniform report for each class would be very valuable to all water works plants.

We have found it a good reference table from which to answer numerous special inquiries of other water works.

Possibly, but all municipalities must be governed by local conditions.

It makes a good form of office and public record, even if used for no other purpose.

Although, as stated, the most common reason given for not adopting the New England form was ignorance of it, still a few objections to it were stated. The most common were that it is too complex for a small plant; that the city or company is too poor to employ sufficient help to prepare the data, and that private companies do not wish to make such information public. Typical replies are:

Any uniform system so far devised has not been applicable to water works of large and small size; one that would apply to a system of 30,000 to 100,000 consumers is too expensive for one of 1,500 to 4,000 consumers, requiring an elaborate system of bookkeeping.

This form has not been used because local conditions form such an important factor and vary so.

Because of former lack of system in our water department.

Uncertainty of tenure of office, as about the time they attempt or are ready to use standard forms of reports a political change occurs, and his successor in office follows the same groove.

Have not been in the water works business long enough to form an intelligent opinion. (*A corroboration of the previous one.*)

Lack of time to properly attend to same.

Wisconsin utilities are obliged to use the classification of accounts prescribed by the State Railroad Commission.

The State of Iowa has adopted a uniform system of municipal accounting and made it mandatory for all cities of 5,000 and over. (*Similar answers from Ohio also.*)

Because the matter has not been energetically brought to the attention of water works officials.

As we are not members of the associations you refer to, we do not receive the forms mentioned. The salary of a superintendent of a water works system in towns of 5,000 and under is not large enough for him to belong to these associations

personally, nor to incur the expense necessary to attend conventions and meetings. The majority of commissioners operating such systems (who are generally politicians) do not see the advantage of having their superintendent belong and attend such conventions. * * * A letter should be sent to commissioners urging them to have their municipality a member of associations, and the advantages to be gained.

Lack of proper records, inadequate office force, or the ignorance, indolence or lack of interest of the head of the waterworks.

The work involved. Probably it could be simplified so as to induce its more extended use.

Because its urgent importance and necessity are not apparent, and a great many waterworks officials, like other humans, always put off those things which do not have to be done.

Because of its cumbersomeness. We have a much better system here than I have designed.

The expense of printing them.

A great many waterworks plants are run in a more haphazard manner, considering the amount of money involved, than any other line of business.

Coming now to the ideas as to the aims of standard forms, we find the following opinions:

Forms should be made thorough, that is, covering all facts relative to plant and operating and maintaining same, and at the same time should not be complicated.

To show costs in minute detail, and in a general way all sources of income.

A good and fair comparison of conditions and expenses.

A very compact report of expenses, receipts, etc., can be made which will show with very little figuring the cost of each line of work in the waterworks business, and also just what part may be running at a loss.

Municipal deficits; corporate profits; how to give good service at reasonable rates.

To show the comparative economy and efficiency. It should prove the advantage or otherwise of general metering; high-duty pumping engines; what is a fair price for water; what should be charged off for depreciation.

Simplicity and clearness.

Uniformity and accuracy.

To give briefly, for each department, the cost of maintenance, upkeep, gross and net earnings.

Simplicity. To secure greater efficiency.

Comparisons of operating conditions.

Comparisons of operating efficiency.

Several complained that the form herein discussed is too complicated for them to use. Most of these are in charge of small plants, it is true; but the majority of the plants of the country are small ones; and these should therefore receive at least equal consideration with the large. Moreover, the large plant is more likely to have available the ability to expand a condensed form along practicable lines, than the small one is to condense a form too complicated for its use. If either extreme must be sought, therefore, it seems to use that it should be simplicity rather than elaborate comprehensiveness. Another argument for this is that it is much easier to persuade an official to adopt a simple form, and later educate him to a more elaborate one, than it is to secure, even by State law, an adequate and reliable use of a complicated form by one who has never before filled out a form of any kind. Too complicated elaborateness is, in our opinion, a handicap of the form recently proposed by the committee of the American Water Works Association which will absolutely prevent its adoption, at least until officials have been educated by several years of experience with a simpler one.

Another form of investigation of this subject has been undertaken by MUNICIPAL JOURNAL, and the result is shown elsewhere in this issue. This consisted in sending about one-half of the New England form to several hundred water works superintendents, with the request that they fill it out as far as possible. About four hundred have done so, and it is seen that most of them had available in some form the answers to the greater part of these questions. In some cases the form itself appeared to be responsible for failure to reply or a misunderstanding of the question. This is considered in the article discussing these tables.

WATER WORKS STATISTICS OF AMERICAN CITIES

Latest Data from Several Hundred Water Works Superintendents, Giving Source and Method of Supply, Method of Treatment, Population Supplied, Consumption, Percentage Metered and Cost of Supplying Water

We present herewith the first instalment of statistics obtained by us from the officials of water works departments of nearly four hundred cities of the United States. These tables give a general description of the plant and certain figures concerning consumption, metering and cost of supplying water. Others, to appear in later issues, will give information concerning distribution systems and service connections. These data were kindly furnished us on blanks which were practically a part of the form recommended by the New England Water Works Association, and referred to on another page of this issue. In using this form for this purpose we had two objects in view in addition to that of obtaining the figures and other data; to learn to what an extent the plants of the country have at hand the information necessary for filling out this form; and to show, to the superintendents who had never used it, just how much—or how little—labor is involved in reporting in accordance with this form.

Most should certainly be able to fill out table No. 1 without any difficulty whatever; although we find some cities in which no count, calculation or estimate has been made of the population living along the lines of the mains, or of those actually served by house connections. Table No. 2 was less fully answered; only about 71 per cent. hav-

ing given even an estimate of the consumption; and not more than 45 per cent. furnished figures as to cost of supplying water. This will be discussed at greater length further on in this article.

Of the plants listed in these tables 75½ per cent. are municipal. This is, we believe, larger than the percentage of municipal plants in the country as a whole; and appears to bear out the statement frequently made that private plants are less willing than municipal ones to give out figures concerning their properties and operation details. Classifying the plants generally as pumping and gravity, we find 72½ per cent. in the former class. Classifying them further as cities of over and under 30,000 population, we find 71½ per cent. of the smaller to be pumping, and 77 per cent. of the larger. If we investigate the distribution of privately owned plants among the larger, as compared with the smaller municipalities, we find that about 14 per cent. of the plants in the larger cities are privately owned, and 28 per cent. of those in the smaller cities.

We find 67 plants reporting the filtration of their water by either slow sand or mechanical filters; nine report "sedimentation" or "coagulation" without filtration; hypochlorite, chlorine or copper sulphate is reported by nine; (Continued on page 956.)

TABLE No. 1.—STATISTICS OF WATER WORKS OF THE UNITED STATES.

General Information.						Population		
Name of city.	Date of construction.	Private or municipal.	Source of supply.	Gravity or pumping.	Method of treatment.	Total.	On pipe lines.	Sup. with water.
Alabama:								
Mobile	1888-1900	Municipal.	Mountain creeks	Gravity.	None	75,000	.....	65,000
Troy	1895.	Municipal.	Springs	Pumping.	None	6,000	3,500	3,100
Arkansas:								
Helena	1892.	Private.	Wells.	Gravity.	None	25,000	15,000	10,000
Rogers	1881.	Private.	Springs	Pumping.	None	3,500	3,500	3,000
California:								
Pomona	1885.	Private.	Tunnel and wells.	Both.	None	14,000	14,000	14,000
Stockton	1891.	Private.	1,000-ft. artesian wells.	Pumping.	None	25,000	25,000	25,000
Watsonville	1874.	Private.	Mountain streams	Gravity.	Filtration	5,000	5,500	5,500
Colorado:								
Colorado Springs	1899.	Municipal.	Impounding reservoirs	Gravity.	None	33,500	33,500	33,500
Greeley	1907.	Municipal.	River	Gravity.	Filters	10,000	10,000	11,000
Las Animas	1889; '08.	Municipal.	Well.	Pumping.	None	2,180	1,800	.....
Victor	1896.	Municipal.	Mountain stream	Gravity.	None	4,000	.....	3,000
Connecticut:								
Meriden	1867-1895	Municipal.	Impounding reservoirs.	Both.	None	32,000	.....	25,000
Middletown	1865-1897	Municipal.	Impounding reservoir.	Gravity.	None	22,000	20,500	20,000
Naugatuck	1887.	Private.	Springs and brooks.	Gravity.	None	13,000	10,000	10,000
New Britain	1887.	Municipal.	Brooks and impndg. reservoir.	Gravity.	None	50,000	47,000	47,000
New London	1872.	Municipal.	Lake and impounding reservoir.	Both.	None	20,000	19,800	19,000
Norwich	1870.	Municipal.	Impounding reservoir.	Gravity.	None	28,000	22,000	20,000
South Norwalk	1875 & '02	Municipal.	Impounding reservoir.	Gravity.	Dbl. aeration & slow sand fil	10,000	14,000	11,000
Torrington	1878.	Private.	Reservoirs.	Gravity.	None	.....	.....	.....
Winsted	1862.	Municipal.	Spring	Gravity.	None	9,500	8,500	8,000
Delaware:								
Dover	1882	Municipal.	Surface and artesian wells.	Pumping.	None	4,500	4,000	3,500
Milford	1891.	Municipal.	Artesian wells.	Pumping.	None	3,300	1,500	.....
Wilmington	1905-1911	Municipal.	Creek.	Pumping.	Slow sand filters	89,500	88,500	88,500
Florida:								
Daytona	1909.	Municipal.	Artesian wells.	Pumping.	Aeration and softening....	4,000 ¹	3,000 ¹	1,500
Pensacola	1886.	Mun. (1908)	130-ft. wells	Pumping.	None	27,000	20,000	16,000
Georgia:								
Athens	.....	Municipal.	River	Pumping.	Gravity mech. filters....	18,000	.....	10,000
Cedartown	1891.	Municipal.	Spring.	Pumping.	None	6,000	.....	800
Fort Valley	1893.	Municipal.	Deep wells	Pmpg., comp.air.	None	3,000	2,500	2,500
Moultrie	1897.	Municipal.	Deep wells.	Pumping.	None	5,000	4,500	4,500
Rome	1894.	Municipal.	River.	Pumping.	Gravity mech. filters....	13,000	.....	.....
Sandersville	1904.	Municipal.	Artesian well	Pumping.	None	2,800	1,500	1,200
Tifton	1907.	Municipal.	Deep well.	Pumping.	None	3,400	3,400	3,400
Waynesboro.	1907.	Municipal.	Artesian wells.	Pumping.	None	3,500	2,000	1,900
Idaho:								
Moscow	.....	Municipal.	Artesian wells.	Pumping.	None	.....	.....	.....
Illinois:								
Aurora	1885.	Municipal.	Artesian wells.	Pumping.	None	30,000	28,000	25,000
Beardstown	1893.	Municipal.	Driven wells	Pumping.	None	6,500	5,000	.....
Belleville	1885.	Private.	Wells in river bed.	Pumping.	None	25,000	20,000	12,500
Bushnell	1889.	Municipal.	Wells.	Pumping.	None	2,700	1,000	1,000
Champaign-Urbana	1884.	Private.	Deep wells	Pumping.	None	25,000	.....	18,405
Chicago	.....	Municipal.	Lake Michigan	Pumping.	None	2,259,000	.....	.....
Elgin	1888.	Municipal.	Artesian wells	Direct pumping.	None	26,000	22,100	22,100
Evanston	.....	Municipal.	Lake	Pumping.	None	33,000	.....	.....

For footnotes, see page 952.

TABLE NO. 1.—STATISTICS OF WATER WORKS OF THE UNITED STATES
General Information (Continued)

General Information (Continued)						Population		
Name of city.	Date of construction.	Private or municipal.	Source of supply.	Gravity or pumping.	Method of treatment.	Total.	On pipe lines.	Sup. with water.
Illinois (Continued):								
Hinsdale	1892.	Municipal.	Well	Pumping.	None	3,000	2,500	2,000
Kewanee	1887.	Municipal.	Deep wells.	Pumping.	None	15,000	5,000	3,000
Lake Forest	1891.	Private.	Lake Michigan.	Pumping.	Filtration	3,000	3,000	3,000
Marshall	1900.	Municipal.	Driven wells	Pumping.	None	2,500	1,500	1,200
Mascoutah	1906.	Municipal.	Well	Pumping.	None	3,000	1,000	500
Moline	1883.	Municipal.	Mississippi River	Gravity.	Grav. mech. fil. and sterilizn	25,000	20,000	20,000
Monticello		Municipal.	Deep wells.	Pumping.	None	2,000		
Morris		Municipal.	Deep wells.	Pumping.	None	5,000	4,500	4,000
Oak Park	1909-1911	Municipal.	Lake Michigan.	Pumping.	None	22,000		
Olney	1891.	Municipal.	River and reservoir	Pumping.	None	5,100	2,000	1,350
Peoria	1868. ⁴	Private.	Open wells in gravel	Pumping.	None	73,000	57,000	42,000
Quincy	1871.	Private.	Mississippi River	Double pumping.	Sedimentation & filtration.	37,000	33,000	25,000
Rock Island	1881.	Municipal.	Mississippi River		Mechanical filtration.	25,000		
St. Charles	1906.	Municipal.	Deep wells.	Pumping.	None	5,000	3,000	1,500
Streator	1886.	Private.	River	Pumping.	Filtration	16,000	13,500	13,000
Indiana:								
Auburn	1898.	Municipal.	Deep wells.	Pumping.	None	5,000		3,500
Brookville	1890.	Municipal.	River	Pumping.	None	2,100		
Clinton	1904.	Private.	Wells.	Pumping.	None	8,500	7,000	5,000
East Chicago	1894.	Private.	Lake Michigan	Pumping.	None	20,000	19,000	19,000
Elkhart	1884.	Private.	Wells.	Pumping.	None	20,000	14,000	14,000
Garrett	1896.	Municipal.	Wells	Pumping.	None	5,149	4,000	3,200
Gas City	1897.	Municipal.	Deep wells	Air pumping.	None	3,200	3,000	2,000
Greenfield	1890.	Municipal.	Deep wells	Air lift.	None	5,000	3,000	3,000
Jeffersonville	1906-1910	Private.	Wells.	Pumping.	None	12,000	8,000	5,000
Linton	1902.	Private.	Wells			6,000	4,000	3,000
Madison	1871.	Municipal.	Ohio River	Gravity.	None	8,000	6,000	5,000
N. Manchester	1894.	Municipal.	Flowing wells	Both.	None	3,000	5,000	5,000
Richmond	1884.	Private.	Infiltration galleries.	Pumping.	None	22,000	20,000	20,000
Rochester	1894.	Municipal.	Lake.	Pumping.	None	3,500	3,000	2,000
Rockport	1887.	Private.	Deep wells	Pumping.	None	3,000	2,000	2,000
Rushville	1884.	Municipal.	Deep wells.	Pumping.	None	6,000	5,000	5,000
Shelbyville			Curb well and 6 drilled wells.	Gravity.	None	10,000	8,500	7,000
Terre Haute	1873.	Private.	River.	Direct pumping.	Mechanical filtration.	60,000		
Tipton	1894.	Municipal.	Wells	Pumping.	None	5,500		5,000
Valparaiso	1885.	Private.	Lake and wells	Direct pumping.	Filtration	8,000	7,000	6,500
Vincennes	1887.	Private.	River	Pumping.	Filtration	15,000		1,500
West Lafayette	1894.	Private.	Wells.	Pumping.	None	4,000	3,500	3,500
Iowa:								
Albia	1907.	Municipal.	Reservoir.	Pumping.	None	5,000		
Atlantic	1883.	Municipal.	Wells	Pumping.	None	5,000	4,500	4,500
Boone	1888-1911	Municipal.	Wells in river gravel.	Pumping.	Natural filtration	12,000	8,000	5,000
Burlington	1878.	Private.	Mississippi River	Pumping.	Sedimentation & filtration.	24,324		
Carroll	1888.	Municipal.	Wells	Pumping.	None	4,000	3,000	3,000
Cedar Falls	1889.	Municipal.	Wells	Pumping.	None	6,000	5,500	5,500
Dubuque	1869.	Municipal. ⁵	Wells.	Direct pumping.	None	40,000		
Fairfield	1885.	Municipal.	Artificial lake	Pumping.	Filtration	5,000	3,000	2,000
Knoxville	1887.	Municipal.	Small stream	Pumping.	Settling reservoir		2,000	1,500
Muscataine	1876.	Municipal.	Driven wells.	Pumping.	None	16,000	10,000	8,000
Mt. Pleasant	1903.	Municipal.	Wells	Pumping.	None			
Shenandoah	1892.	Municipal.	Wells	Pumping.	None	5,000	2,500	2,500
Tama	1905.	Municipal.	Wells	Pumping.	None	2,650	1,800	1,500
Vinton	1888.	Municipal.	Wells	Pumping.	None	3,500	2,000	1,800
Kansas:								
Atchison	1880.	Private.	Mississippi River	Pumping.	Coagulation & sedimentat'n	16,000	15,000	13,000
Clay Center	1885.	Municipal.	Wells	Direct pumping.	None	3,800	2,900	2,500
Coffeyville	1895.	Municipal.	River	Pumping.	Settling basin. ⁶	15,000	12,000	10,000
Hoisington	1905.	Municipal.	Deep wells.	Pumping.	None	2,700	2,700	2,100
Horton	1890. ⁷	Municipal.	Impounding reservoir.	Gravity.	Pressure filter	4,500	1,000	1,200
Ottawa	1907.	Municipal.	River.	Direct pumping.	Coagulation.	7,500	4,000	
Kentucky:								
Danville	1894.	Municipal.	River	Pmpg to standp.	Filtration	5,200	4,500	3,500
Glasgow	1897.	Private.	Creek.	Pumping.		2,500	2,000	
Lexington	1884.	Private.	Impounding reservoir	Gravity.	Filtration	35,000	30,000	30,000
Louisville	1860.	Municipal.	River	Pumping.	Filtration	227,000	220,000	204,000
Madisonville		Private.	Artificial lake	Pumping.	None	5,000		
Paris	1891.	Private.	River.	Pumping.	Filtration	8,000	6,000	5,000
Louisiana:								
New Orleans	1908.	Municipal.	Mississippi River	Direct pumping.	Sed.mntn, coagulatn, filtratn			
Maine:								
Augusta	1886.	Municipal.	Pond and lake	Both.	None	16,000	12,100	11,600
Bangor	1875.	Municipal.	River.	Pmpg to standp.	Mechanical filtration.	25,000	24,000	24,000
Biddeford	1884.	Private.	River.	P. to res. & stdp.	Filtration	27,000	25,000	25,000
Brewer	1890.	Private.	River	Pmpg to standp.	Mechanical filtration.	5,500	5,000	5,000
Calais	1886.	Private.	Shallow well	Pumping.	None	9,000	9,000	9,000
Ellsworth	1889.	Private.	Stream	Pumping.	Filtration	5,000	3,000	
Gardiner	1885.	Municipal.	Pond and lakes	Pumping.	None	10,000	7,500	6,500
Hallowell	1898.	Municipal.	Springs and stream	Both.	None	3,300	3,000	2,800
Lewiston	1878.	Municipal.	Lake.	Pumping.	None	28,000	27,000	27,000
Pittsfield	1894.	Municipal.	River.	Pumping.	None	3,500	2,000	2,000
Skowhegan	1888.	Private.	Artificial pond.	Pumping.	None	6,000	5,000	3,000
Maryland:								
Baltimore		Municipal.	River and creek.	Both.		590,000		590,000
Easton	1886.	Private.	Artesian wells	Pumping.	None	4,000	3,000	2,000
Massachusetts:								
Boston	1849.	Municipal.	Lake and rivers	Both.	None	688,500	688,500	688,500
Brockton	1880.	Municipal.	Lake	Pumping.	None	69,500	68,700	68,200
Brookline	1874.	Municipal.	Driven wells and filter galleries	Pumping.	None	28,000	28,000	28,000
Cambridge	1855. ¹⁵	Municipal.	Ponds.	Pumping.	None	104,839	104,839	104,839
Clinton	1883.	Municipal.	Ponds.	Gravity.	None	13,100	13,100	13,100
Concord	1873.	Municipal.	Ponds.	Gravity. ⁸	None	6,421	6,000	6,000
Danvers	1876.	Municipal.	Ponds.	Pumping.	None	10,000	10,000	10,000
Everett	1871.	Municipal.	Metropolitan supply.	Gravity.	None	35,000	35,000	35,000
Fitchburg	1872.	Municipal.	Brooks and ponds	Gravity.	None	37,000	36,000	36,000
Framingham	1885.	Municipal. ⁹	Filter galleries and metpitr sup.	Pumping.	None	13,500	11,710	10,710
Gardner	1882.	Private.	Lake	Pumping.	None	15,236	14,699	14,474
Gloucester	1884.	Municipal.	Storage reservoirs	Pumping.	None	36,000 ¹⁰	33,000	28,000
Holyoke	1872.	Municipal.	Reservoirs, ponds and river.	Gravity.	None	57,730	57,313	56,901
Lynn	1871.	Municipal.	Ponds and river	Pumping.	Storage	100,199	100,199	100,199
Middleboro	1885.	Municipal.	Well.	Pumping.	None	5,200	4,900	4,600
New Bedford	1869. ¹¹	Municipal.	Ponds.	Pumping to res.	None	102,700	97,000	96,000
Newburyport	1881.	Municipal.	River, springs and wells.	Pumping.	Part filtered	15,000	14,500	14,000
Newton	1876.	Municipal.	Collecting gallery	Pumping.	None	40,600	40,300	40,200
North Adams	1864. ¹²	Municipal.	Brooks.	Gravity.	None	25,000	24,000	23,500
Northampton	1870-1893	Municipal.	Mountain streams	Gravity.	None	20,000	19,500	19,000
North Attleboro	1884.	Municipal.	Large wells.	Pumping.	None	9,650	9,340	9,210
Peabody	1797.	Municipal. ¹³	Spring, ponds and lake.	Pumping to res.	None	17,000	16,500	16,500
Reading	1891.	Municipal.	Filter galleries.	Pmpg to standp.	Filtration for iron	5,950	5,940	5,650

For footnotes, see page 952.

TABLE NO. 1.—STATISTICS OF WATER WORKS OF THE UNITED STATES
General Information (Continued)

Name of city.	Date of construction.	Private or municipal.	Source of supply.	Gravity or pumping.	Method of treatment.	Population		
						Total.	On pipe lines.	Sup. with water.
Massachusetts (Continued):								
Revere	1884.	Municipal.	Metropolitan supply	Gravity.	None	18,214	18,000	18,000
Somerville	1868.	Municipal.	Metropolitan supply	Gravity.	None	79,000	79,000	79,000
Springfield	1864. ¹⁴	Municipal.	River.	Gravity.	Slow sand filters	92,003	90,864	90,527
Taunton	1876.	Municipal.	Ponds.	Direct pumping.	None	34,000	32,500	32,500
Turners Falls	1886.	Municipal.	Lake.	Pumping.	None	7,000	7,000	6,400
Waltham	1872.	Municipal.	Filter basin.	Pumping.	None	28,000	28,000	28,000
Wellesley	1884.	Municipal.	Large and driven wells.	Pumped to res.	None	7,500	7,450	7,300
Westfield	1874.	Municipal.	.....	Gravity.	None	16,000	.....	.....
Michigan:								
Alpena	1905.	Municipal.	Lake	Pumping.	None	12,650	12,400	12,500
Battle Creek	1887.	Municipal.	Lake	Pmpd. to stndp.	Hypochlorite	27,000	24,000	23,000
Coldwater	1891.	Municipal.	Driven and large wells	Pumping.	None	7,000	6,500	3,500
Detroit	1827.	Municipal.	River.	Pumping.	None	499,030	523,000	521,146
Escanaba	1886.	Private.	Lake	Pumping.	Filtration	13,200	12,000	10,000
Greenville	1888.	Municipal.	Driven wells	Direct pumping.	None	4,500	3,400	3,400
Holland .....	.....	Municipal.	Ground water	Pumping.	None	10,760	9,500	8,428
Howell	1894.	Municipal.	Wells.	Pumping.	None	2,500	2,000	2,000
Ishpeming	1882.	Municipal.	Lakes.	Both.	None	14,000	13,000	13,000
Lansing	1885.	Municipal.	Wells.	Pumping.	None	40,000	35,000	28,000
Manistique	1906.	Municipal.	River.	Gravity.	None	4,722	4,000	2,000
Marquette	1870.	Municipal.	Lake Superior	Pumping.	None	12,000	.....	.....
Marshall	1889.	Municipal. ¹⁶	Wells.	Pumping.	None	5,000	3,000	3,000
Mt. Pleasant	1880.	Municipal.	Wells.	Pumping.	None	5,000	.....	.....
Muskegon	1891.	Municipal.	Lake	Pumping.	None	25,000	5,500	.....
Saginaw	1873.	Municipal.	River	Pumping.	None	50,510	36,229	19,467
Ypsilanti	1889.	Municipal.	Wells.	Pmpd. to stndp.	None	8,000	8,000	7,000
Minnesota:								
Brainerd	1883.	Municipal.	Mississippi River	Direct pumping.	Hypochlorite	10,000	1,500	1,469
Duluth	1878.	Municipal. ¹⁰	Lake.	Pumped to res.	None	80,000	70,000	60,000
Eveleth	1904.	Municipal.	Lake.	Pumping.	None	7,036	.....	8,000
Faribault	1883.	Municipal.	Artesian wells	Pumping.	None	10,960	5,000	4,900
Hutchinson	1894.	Municipal.	Artesian well	Pumped to tank.	.....	2,400	600	500
Mankato .....	.....	Municipal.	Artesian wells.	Pumping.	None	10,600	7,000	6,000
Marshall	1894.	Municipal.	Artesian wells.	Pumping.	None	2,300	1,800	1,200
Northfield	1894.	Municipal.	Artesian well	Both.	None	3,500	.....	.....
Owatonna	1890.	Municipal.	Flowing wells	Pumping.	None	6,000	4,500	4,000
Worthington	1889.	Municipal.	Wells.	Pumping.	None	2,400	800	800
Mississippi:								
Bay St. Louis ..	1892.	Private.	Artesian wells	Gravity.	None	3,000	2,000	2,000
Greenwood .....	.....	Municipal.	Artesian wells.	Gravity.	None	10,000	.....	.....
Natchez	1889.	Municipal.	Deep wells	Pumping.	None	12,000	10,000	.....
Pass Christian ..	.....	Municipal.	Artesian wells .....	.....	.....	2,500	1,500	1,100
Yazoo City	1904.	Municipal.	Artesian wells	Pumping.	None	7,000	6,000	6,000
Missouri:								
Brookfield	1891.	Municipal.	Wells.	Pumping.	None	6,500	.....	.....
Butler	1890.	Private.	River	Pumping.	Aeration and coagulation. .	3,500	2,500	2,000
Caruthersville ..	1904.	Municipal.	Well.	Pumping.	.....	4,500	3,500	2,500
Hannibal	1880.	Private.	Mississippi River	Pumped to res.	Coagulation	20,000	.....	.....
Kansas City	1875. ¹⁷	Municipal.	River	Pumping.	Sed., with coaglatn & hypo	260,000	260,000	250,000
Pierce City .....	.....	Municipal.	Spring	Pumping.	None	2,100	.....	.....
St. Louis	1899.	Municipal.	Mississippi River.	Pumping.	Coagulation & sedimentatn	707,500	.....	700,000
Nebraska:								
Ashland	1887.	Municipal.	Wells.	Pumping.	None	1,400	1,000	900
Chadron	1889-1911	Municipal.	Springs	Gravity.	None	3,100	3,000	3,000
Grand Island	1886.	Municipal.	Wells	Pumping.	None	10,800	.....	.....
Lincoln	1878.	Municipal.	Deep wells.	Pumping.	None	52,000	40,000	38,000
Nevada:								
Reno and Sparks .....	.....	Private.	River and creek	Gravity.	None	14,820	13,000	12,750
New Hampshire:								
Claremont	1887.	Municipal.	Brooks and impndg. reservoirs.	Both.	None	8,000	5,000	5,000
Concord	1872.	Municipal.	Lake	Gravity. ¹⁸	None .....	.....	.....	.....
Dover	1889.	Municipal.	Pond, springs and wells	Double pumping.	Aeration and filtration.	13,247	13,000	13,000
Keene	1868-1902	Municipal.	Lakes.	Gravity.	None	10,500	9,500	10,000
Newport	1894.	Municipal.	Pond.	Gravity.	None	4,000	3,300	3,000
Somersworth	1896.	Municipal.	River.	Gravity.	Sand filtration	7,500	.....	6,750
New Jersey:								
East Orange	1882.	Municipal.	Artesian wells	Pumped to res.	None	35,850	.....	.....
Kearney .....	.....	Private.	.....	Pumping.	Filtration	20,000	.....	.....
Madison	1889.	Municipal.	1 large, 5 driven wells.	Pmpd. to stndp.	None	5,000	5,000	4,500
Millville	1880.	Private.	River	Pumping.	Filtration	13,000	10,500	7,250
Newark	1891.	Municipal.	River.	Gravity.	None	370,000	384,000	384,000
New Brunswick ..	1868.	Private.	Brook.	Pumped to res.	Hypochlorite	35,000	35,000	35,000
Paterson	1849.	Private.	River.	Pumping.	Filtration	127,000	125,000	125,000
Perth Amboy .....	.....	Municipal.	Wells.	Pumping.	.....	34,000	42,000	.....
Ridgewood	1900.	Private.	Wells.	Pumping.	None	5,700	5,000	4,500
Vineland	1900.	Municipal.	Wells.	Pumping.	None	5,500	7,000	5,000
Washington	1882.	Private.	Mountain stream	Gravity.	None	3,500	3,000	3,000
New Mexico:								
Albuquerque	1882.	Private.	Wells.	Pumping.	None	13,000	13,000	10,000
New York:								
Baldwinsville ..	1889.	Municipal.	Well	Pumping.	.....	3,100	2,800	.....
Binghamton	1867.	Municipal.	River.	Direct pumping.	Filtration	50,000	.....	.....
Buffalo	1849.	Municipal. ¹⁹	River and lake	Pumping.	None	425,000	425,000	425,000
Canandaigua	1895.	Municipal.	Lake	Pumped to res.	None	7,300	7,400	7,300
Carthage	1893.	Municipal.	Springs.	Gravity.	None	5,000	4,000	3,000
Catskill	1882.	Municipal.	River.	Pumping.	None	5,500	5,000	5,000
Cooperstown	1854-1880	Private.	Lake	Pumping.	None	3,000	2,750	2,750
Cortland	1884.	Municipal.	Springs.	Pmpd. to stndp.	None	11,500	10,250	9,000
Deposit	1884.	Private.	Stream .....	.....	.....	2,000	1,500	1,500
Dunkirk	1872.	Municipal.	Lake	Pumping.	None	18,000	18,000	18,000
East Chester	1886.	Private.	River, brook and wells.	Both.	None	39,000	38,500	38,500
N. Rochelle.								
Pelham	1859.	Private.	River and creek.	Both.	Filtration	45,000	40,000	35,000
Elmira								
Fairport	1893.	Municipal.	Wells.	Pumping.	None	3,000	3,000	2,500
Frankfort	1894.	Municipal.	Springs.	Gravity.	None	3,500	3,500	3,000
Geneseo	1887.	Municipal.	Lake	Pumped to res.	None	2,067	2,000	1,600
Glens Falls	1872.	Municipal.	Springs and mountain streams. .	Gravity.	None	16,000	16,000	16,000
Gowanda	1887.	Private.	Springs.	Gravity.	None	2,500	2,000	1,500
Hudson	1875-1905	Municipal.	Creek	Gravity.	Filtration	12,000	12,050	12,050
Jamestown	1883.	Municipal. ²⁰	Artesian wells	Pumping.	None	32,000	30,000	35,000
Lestershire .....	.....	Municipal.	Wells.	Pumping.	None	4,000	.....	4,000
Lowville	1894.	Municipal.	Springs.	Gravity.	None	3,000	.....	.....
Malone	1854-1888	Municipal.	Mountain brooks	Gravity.	None	7,000	7,000	7,000
Middletown	1867.	Municipal.	Streams, springs & surface flow	Pumping.	Filtration	15,313	13,336	13,336
Mohawk	1889.	Municipal.	Spring.	Pumping.	None	2,300	2,200	2,150
Newark	1887.	Municipal.	Springs and wells	Air-lift pmpg.	None	7,000	6,500	6,000
Newburg .....	.....	Municipal.	Lake.	Gravity. ²¹	None	29,000	29,000	.....

¹⁹For footnotes, see page 952.

TABLE NO. 1.—STATISTICS OF WATER WORKS OF THE UNITED STATES
General Information (Continued)

General Information (Continued)						Population		
Name of city.	Date of construction.	Private or municipal.	Source of supply.	Gravity or pumping.	Method of treatment.	Total.	On pipe lines.	Sup. with water.
New York (Continued):								
N. Tonawanda	1886.	Municipal.	River.	Direct pumping.	None	12,500	.....	12,200
Oneida	1887.	Municipal.	Springs.	Gravity.	.....	9,000	6,500	5,900
Peekskill	1875.	Municipal.	Creek	Pumping.	Sand filtration	16,000	16,000	16,000
Poughkeepsie ..	1871.	Municipal.	River.	Pumping.	Filtration and hypochlorite	31,000	32,000	32,000
Salamanca	1881.	Municipal.	Creek and wells	Both.	None	6,000	5,900	5,400
Schenectady	1905.	Municipal.	Collecting galleries.	Pumping.	None	75,000	73,500	71,250
Sidney	1889.	Private.	Impounding reservoir	Gravity.	Filtration	3,000	5,700	2,700
Solvay	1895.	Municipal.	Lake	Pumping.	None	5,300	5,100	5,100
Troy	1833.	Municipal.	Creeks and ponds.	Gravity.	None	78,813	70,000	70,000
Whitehall	1884.	Municipal.	Creek and surface flow.	Pumping.	None	6,000	4,500	3,800
North Carolina:								
Elizabeth City ...	1903.	Private.	Creek	Pumping.	Mechanical filtration	8,412	6,000	2,000
Washington	1902.	Private.	Wells.	Pumping.	None	7,000	5,000	3,000
Wilmington	1883-1910	Municipal.	River	Pumping.	Filtration	27,500	21,000	15,000
Ohio:								
Barnesville	1905.	Municipal.	Impounding reservoir	Pumping.	None	4,500	4,000	1,500
Canal Dover	1895.	Municipal.	Wells.	Pumping.	None	7,000	.....	5,000
Cincinnati	1897-1909	Municipal.	River	Pumping.	Filtration and other.	383,700	395,000	395,000
Cleveland	1856.	Municipal.	Lake.	Pumping.	Chlorine	630,000	620,000	618,000
Covington	1905.	Municipal.	Shallow wells.	Pumping.	None	2,000	1,550	1,400
Delaware	1889.	Private.	Wells.	Pumping.	None	11,000	9,000	8,000
Eaton	1891.	Municipal.	Well and spring	Pumping.	None	3,150	2,500	1,600
Hicksville	1892.	Municipal.	Wells	Pumping.	None	2,800	1,400	1,000
Leontonia	1889.	Municipal.	Wells	Gravity.	None	2,800	.....	.....
Portsmouth	1871.	Municipal.	River	Gravity.	None	27,000	25,000	25,000
Salineville	1892.	Municipal.	Wells.	Gravity.	None	2,700	2,600	2,000
Toledo ...1874, 1893, 1910		Municipal.	River.	Pumping.	Mechanical filtration.	180,000	150,000	140,000
Washington	1889.	Private.	Wells.	Pmpd. to stdnp.	None	7,700	6,000	6,000
Waverly	1912.	Municipal.	Wells.	Pmpd. to stdnp.	Filtration & softening.	2,060	1,200	.....
Youngstown	1872.	Municipal.	River	Pumping.	Mechanical filtration	80,000	70,000	60,000
Oklahoma:								
Davis	1905.	Municipal.	Well.	Pumping.	None	1,500	.....	140
Lawton	1908.	Municipal.	Impcunding reservoir	Gravity.	None	10,000	8,000	7,000
Shawnee	1900.	Municipal.	River	Pumping.	Chemical filtration	15,000	11,000	10,000
Oregon:								
Portland	1894.	Municipal.	River	Both.	None	207,214	190,600	190,600
Pennsylvania:								
Allentown	1869.	Municipal.	Springs	.....	None	53,200	53,000	53,000
Bradford	1884.	Municipal.	Springs	Both.	None	18,000	17,000	17,000
Carbondale	1867.	Private.	Reservoirs, ponds, creeks & wells	Gravity.	None	17,500	25,000	25,000
Franklin .....	.....	Municipal.	Deep wells and creek.	Pumping.	Filtration of part.	12,000	.....	12,000
Gettysburg	1894.	Private.	Mountain stream	Pumping.	Filtration	4,250	4,250	4,250
Harrisburg	1843.	Municipal.	River	Pmpg to res.	Mechanical filtration.	70,000	69,000	70,000
Honesdale .....	.....	Private.	Lakes	Gravity.	None	6,000	5,000	4,500
Huntingdon	1885.	Private.	Creek.	Pumping.	Slow sand	8,000	.....	7,500
Indiana	1887.	Private.	Creek.	Pumping.	Filtration	6,000	4,000	4,500
Lancaster .....	.....	Municipal.	Creek	Pumping.	Filtration	50,000	41,000	.....
McDonald	1894.	Private.	Creek and impounding reservoir.	Pumped to tank.	None	5,000	5,000	4,000
Media	1854.	Municipal.	Creek	Pumping.	Filtration	3,762	6,000	5,600
Meyersdale	1888.	Private.	Springs	Gravity.	None	3,500	3,500	3,500
North East	1885.	Municipal.	Springs & impounding reservoir.	Gravity.	Part filtered	3,000	3,000	2,500
Philadelphia	1790.	Municipal.	Rivers	Pumping.	Filtration	1,600,000	1,500,000	1,500,000
Reading	1819.	Municipal.	Springs and creeks	Both.	Part filtrd, part cop. sulph	99,020	98,820	98,920
Shenandoah	1894.	Municipal.	Springs, wells and stream.	Pumping.	None	27,000	18,500	.....
Susquehanna	1874-1894	Private.	Springs.	Gravity.	Filtration	4,500	4,010	3,000
Rhode Island:								
Westerly	1887.	Municipal.	Driven wells	Pmpg to standp.	.....	13,500	12,000	11,000
Woonsocket	1884.	Municipal.	Brook.	Dir. pmp to stdp.	None	39,421	44,700	44,200
South Carolina:								
Florence .....	.....	Municipal.	Deep wells.	Pumping.	None	8,000	6,000	4,200
Orangeburg	1899.	Municipal.	Wells.	Air-lift. & steam pumping.	None	6,700	4,500	3,000
South Dakota:								
Mitchell	1888.	Municipal.	Artesian wells.	Pumping.	None	7,500	6,000	3,500
Yankton	1884.	Municipal.	Artesian wells	.....	.....	4,000	.....	.....
Tennessee:								
Memphis	1892.	Municipal.	Artesian wells.	Pumping.	None	175,000	180,000	180,000
Texas:								
Denton	1891.	Municipal.	Artesian wells	Air-litt pumping.	Filtration	8,000	5,000	6,000
Houston	1879.	Municipal.	Artesian wells	Pumping.	None	109,594	85,000	72,500
Laredo	1883-1912	Private.	River	Pumping.	Filtration	16,000	12,000	16,000
Utah:								
Logan .....	.....	Municipal.	River	Gravity.	None	7,500	.....	.....
Salt Lake City ..	1880.	Municipal.	Mountain streams	Gravity.	None	93,000	90,000	90,000
Springville	1910.	Municipal.	Creek and springs	Gravity.	None	4,000	1,500	2,000
Vermont:								
Bellows Falls ...	.....	Municipal.	Pond	Gravity.	.....	6,000	6,000	6,000
St. Albans	1872.	Municipal.	Impounding reservoir.	Gravity.	None	6,300	6,000	6,000
Virginia:								
Charlottesville ..	1886.	Municipal.	Springs and impndg reservoir..	Gravity.	None	10,000	9,000	7,500
Covington	1890.	Municipal.	Springs	Gravity.	None	5,000	5,000	5,000
Farmville .....	.....	Municipal.	River	Pumping.	Sedimentation & filtration.	3,000	2,500	1,500
Washington:								
Hoquiam	1898.	Private.	Mountain streams	Pumping.	None	10,000	10,000	10,000
Seattle .....	.....	Municipal.	.....	.....	None	260,000	250,000	250,000
Spokane	1884.	Municipal.	Wells.	Pumping.	.....	110,000	99,000	.....
West Virginia:								
Sistersville	1893.	Municipal.	River	Pumped to res.	None	3,000	.....	3,000
Wisconsin:								
Algoma	1903.	Municipal.	Well.	Pumping.	None	2,052	1,800	1,000
Ashland	1885.	Private.	Lake	Direct pumping.	Filtration	12,000	11,000	11,000
Berlin	1896.	Municipal.	Artesian wells	Both.	None	4,670	.....	.....
Eau Claire	1885.	Municipal.	Wells.	Pumping.	.....	20,000	.....	.....
Fort Atkinson ..	1901.	Municipal.	Well.	Pumping.	None	4,000	.....	2,200
Millsville	1895.	Municipal.	River	Pumping.	Filtration	2,381	2,000	1,800
Milwaukee	1872.	Municipal.	Lake	Pumping.	Hypochlorite at times	390,000	390,000	400,000
Ripon	1890.	Private.	Wells.	Pumping.	None	3,800	3,000	2,600
Superior	1893.	Private.	Shallow wells	Direct pumping.	Aeration and filtration.	40,384	.....	.....
Watertown	1896.	Municipal.	Artesian wells	Pumping.	None	8,829	5,000	6,000
Wausau	1885.	Municipal.	Driven wells.	Pumping.	None	17,000	15,000	12,000
Wauwatosa	1897.	Municipal.	Artesian wells.	Pumping.	None	3,400	3,000	2,500

¹ These are summer populations; during tourist season, 8,000, 8,000 and 4,000, respectively. ² Iron removal plant about to be installed. ³ Bought from City of Chicago, pressure raised by booster pump. ⁴ Built by city, purchased and rebuilt by company in 1890. ⁵ Purchased by city in 1900. ⁶ Filtration plant will be constructed in 1912. ⁷ Purchased by city in 1911. ⁸ Pumping to small high service. ⁹ Purchased by the city in 1906. ¹⁰ Summer population; winter population 24,398. ¹¹ New supply built in 1895 to 1901. ¹² Additions in 1878, 1889, and 1895. ¹³ Purchased by town in 1873. ¹⁴ Bought by city in 1872. ¹⁵ Purchased by city in 1865. ¹⁶ Purchased by city in 1898. ¹⁷ Purchased by city in 1895. ¹⁸ Also pumping to reservoir for high-service and fire protection. ¹⁹ Purchased by city in 1868. ²⁰ Purchased by city in 1903.

TABLE NO. 2.—STATISTICS OF WATER WORKS OF THE UNITED STATES
Consumption and Cost

Name of city.	Total for the year.	Passed through meters.	Per cent. metered.	Average daily consumption.	Consumption.			Cost of supplying water per million gallons figured on	
					per inhabitant.	Gallons per day per consumer.	per tap.	Total maintenance.	+ interest on value of property.
Alabama:									
Mobile	4,750,000	.....	11	13,000,000	202	.....	.....	.....	\$20.72
Troy .....	.....	80%	85	260,000	.....	.....	.....	.....	.....
Arkansas:									
Helena	420,540,270	300,000,000	50	1,200,000	60	.....	850	.....	.....
Rogers	109,500,000	34,000,000	30.4	300,000	85	100	357	.....	.....
California:									
Pomona .....	.....	.....	40	.....	.....	.....	.....	.....	.....
Stockton	1,205,951,000	301,475,000	25	3,303,975	132	.....	616	\$48.30	80.69
Watsonville	365,000,000	.....	.....	1,000,000	.....	.....	750	.....	.....
Colorado:									
Colorado Springs	2,471,717,000	.....	16	6,771,800	202	202	580	13.00	39.00
Las Animas .....	.....	.....	.....	600,000	.....	.....	.....	.....	.....
Victor	300,000,000	100,000,000	.....	800,000	.....	.....	.....	.....	.....
Connecticut:									
Meriden	1,100,000,000 ¹	.....	.....	3,000,000 ¹	.....	.....	.....	.....	.....
Middletown	730,000,000	124,215,000	16	2,000,000	107	105	847	13.68	46.56
New Britain	2,100,000,000	.....	70	6,000,000	100	100	.....	41.00	.....
New London	1,047,724,000 ¹	363,853,000	35	2,870,500	141 ¹	151 ¹	683 ¹	11.95	.....
Norwich	600,000,000	200,000,000	33½	1,650,000	59	82½	412	25.00	92.00
South Norwalk	760,000,000	.....²	.....	2,200,000	145 ²	.....	.....	33.00	49.00 ⁴
Delaware:									
Dover	36,500,000 ¹	.....	.....	100,000 ¹	.....	.....	.....	.....	.....
Milford .....	.....	.....	.....	400,000	.....	.....	.....	.....	.....
Wilmington	3,713,805,000	2,331,519,000	63	10,177,822	113.2	115	538.3	20.70	53.00
Florida:									
Daytona	20,292,520	10,400,000	51	56,000	8	16	269	161.00	297.00
Pensacola	548,542,433	186,540,082	33½	1,463,160	54	488	585	27.00	38.00
Georgia:									
Athens	382,910,000	All but sewer flushing.	.....	1,050,000	.....	.....	.....	4.32	.....
Cedartown	250,000,000	.....	10	.....	.....	.....	.....	.....	.....
Fort Valley	72,000,000	70,000,000	.....	200,000	.....	.....	.....	.....	.....
Moultrie	60,000,000	.....	33 ¹	150,000	30 ¹	.....	200 ¹	.....	.....
Rome	686,568,000	.....	33½	1,881,008	175	.....	.....	24.64	.....
Sandersville	12,000,000	12,000,000	100	80,000	28.57	68½	400	200.00	.....
Tifton	132,000,000	60,000,000	60	361,640	106	.....	1,291	45.00	50.00
Waynesboro	36,500,000	39,020,000	85	100,000	28	55	388	51.00	85.00
Idaho:									
Moscow .....	.....	.....	100	60,000	400	.....	.....	.....	.....
Illinois:									
Aurora	806,825,341	605,121,260	All but city's.	2,210,488	.....	.....	.....	.....	.....
Belleville	365,000,000	120,000,000	.....	.....	.....	.....	.....	.....	.....
Bushnell	18,250,000	9,000,000	50	50,000	.....	50	.....	800.00	2,500.00
Champaign	550,000,000	.....	.....	1,500,000	.....	.....	.....	.....	.....
Chicago	157,399,860,000	36,522,000,000	23	431,232,000	190	.....	1,666	.....	.....
Elgin	750,000,000	675,000,000	70	1,500,000	90	.....	299	25.58	.....
Hinsdale .....	.....	.....	100	500,000	.....	.....	.....	.....	.....
Kewanee	56,165,000	56,165,000	100	153,870	11	157	.....	156.41	180.00
Lake Forest	192,720,315	81,283,725	42	.....	.....	.....	.....	71.37	.....
Marshall	219,000,000	.....	10	600,000	.....	.....	.....	.....	.....
Mascoutah	1,800,000	360,000	.....	5,000	.....	.....	.....	.....	.....
Moline	1,350,000,000	.....	¼	3,700,000	145	185	925	3.00	.....
Morris	79,635,000	.....	.....	218,180	43	54	.....	.....	.....
Oak Park	122,355,000	122,355,000	100	335,219	.....	.....	130 ⁵	92.96	.....
Olney .....	.....	.....	100	450,000	.....	70	.....	.....	.....
Peoria	3,005,789,115	811,350,000	27	8,235,000	112	196	700	.....	.....
Quincy	682,000,000	420,000,000	61½	1,868,000	50	74.7	343	52.56	108.34
Rock Island .....	.....	.....	20	3,750,000	150	.....	.....	.....	.....
St. Charles	40,000,000	20,000,000	50	99,000	19.8	30	105.2	.....	.....
Streator	652,560,000	215,648,000	33	1,800,000	140	.....	.....	.....	58.92
Indiana:									
Auburn .....	.....	.....	.....	500,000	.....	.....	.....	.....	.....
Clinton	60,000,000	.....	.....	164,383	19½	33	.....	66.23	138.55
East Chicago	1,556,644,011	223,144,000	14	4,264,778	224	.....	.....	.....	.....
Elkhart	1,200,000,000	.....	60	3,000,000	165	.....	820	25.00	36.00
Garrett	182,500,000	.....	.....	500,000	16	.....	625	40.00	.....
Gas City .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Greenfield	300,000,000	100,000,000	50	.....	.....	.....	.....	.....	.....
Jeffersonville	400,000,000	60,000,000	10	1,000,000	.....	.....	.....	.....	.....
Linton .....	.....	.....	.....	350,000	.....	.....	.....	.....	.....
Madison .....	.....	.....	.....	1,000,000	.....	.....	.....	30.00	34.50
N. Manchester	119,500,000	80,000,000	.....	300,000	.....	.....	.....	.....	.....
Richmond	893,000,000	464,000,000	52	2,447,000	112	122	526	.....	.....
Rochester	175,000,000	43,750,000	25	500,000	145	200	1,250	50.00	.....
Rockport	85,000,000	3 meters.	.....	233,000	75	116	665	.....	.....
Rushville .....	.....	.....	5	480,000	126	110	.....	.....	.....
Shelbyville	325,000,000	.....	.....	930,000	.....	.....	.....	.....	.....
Terre Haute	1,418,502,900	684,223,821	48.2	3,886,309	66	.....	664	.....	.....
Tipton	113,884,511	22,775,000	44	312,000	56.7	62.4	335	66.30	72.80 ⁶
Valparaiso	287,500,895	.....	.....	800,000	.....	.....	.....	.....	.....
West La Fayette .....	.....	.....	10	.....	.....	.....	.....	.....	.....
Iowa:									
Albia	52,000,000	All but city.	.....	.....	.....	.....	.....	.....	.....
Atlantic	220,000,000	.....	.....	600,000	120	.....	600	.....	.....
Boone	300,000,000	250,000,000	80	820,000	42	.....	90	.....	.....
Burlington	836,729,673	163,028,046	.....	2,292,433	.....	.....	.....	.....	.....
Carroll	99,500,000	.....	2	300,000	78	.....	.....	.....	.....
Cedar Falls	164,735,000	.....	25	450,000	.....	.....	.....	42.00	62.00
Dubuque	935,867,586	.....	97	2,564,020	.....	.....	.....	36.15	.....
Fairfield	109,000,000	90,000,000	80	300,000	60	150	600	55.00	.....
Knoxville	41,000,000	.....	.....	115,000	.....	.....	.....	150.00	.....
Muscatine	438,000,000	97,000,000	.....	1,200,000	128	.....	.....	31.02	39.41
Mt. Pleasant .....	.....	.....	90	55,000,000	.....	.....	.....	.....	.....
Shenandoah	5,000,000 ¹	.....	½	150,000	30	60	267	700.00	815.00
Tama	53,037,755	.....	5	145,190	60	90	480	40.00	80.00
Vinton	30,000,000	30,000,000	100	.....	.....	.....	.....	.....	.....
Kansas:									
Atchison	425,000,000	163,000,000	38	1,160,000	72	90	464	60.00	125.00
Clay Center	88,000,000 ¹	35,000,000	45	280,000	112 ¹	.....	466	5.62	8.00
Coffeyville	679,220,000	250,406,000	36.9	1,833,480	122	.....	968	15.20	34.97
Hoisington	7,300,000	6,570,000	80	20,000	15	.....	300	575.00	1,000.00
Ottawa	300,000,000 ¹	.....	.....	800,000	.....	.....	.....	35.00	55.00

For footnotes, see page 956.

TABLE NO. 2.—STATISTICS OF WATER WORKS OF THE UNITED STATES.
Consumption and Cost (Continued)

Name of city.	Total for the year.	Passed through meters.	Per cent. metered.	Average daily consumption.	Consumption.		Cost of supplying water per million gallons figured on maintenance.	Total maintenance.	+ interest on value of property.
					Gallons per day per inhabitant.	Gallons per day per consumer.			
Kentucky:									
Danville	271,000,000	.....	100	742,000	105 ⁷	.....	.....	433.00	.....
Glasgow .....	.....	.....	.....	117,000	.....	.....	.....	.....	.....
Lexington	825,504,131	.....	100	2,261,655	.....	.....	.....	.....	.....
Louisville	8,711,975,875	3,099,988,450	35.6	23,868,420	105	117	645	25.48	32.49
Paris	81,000,000	40 meters.	.....	.....	.....	.....	.....	.....	.....
Louisiana:									
New Orleans ..	5,578,000,000	.....	90	15,300,000	.....	.....	.....	19.70	.....
Maine:									
Bangor	1,479,008,605	.....	1	4,000,000	160	.....	.....	65.75	.....
Biddeford	613,903,161	.....	.....	1,678,452	.....	.....	.....	15.86	.....
Brewer .....	.....	.....	.....	750,000	.....	.....	.....	.....	.....
Ellsworth .....	.....	.....	.....	468,897	.....	.....	.....	.....	.....
Gardiner	243,000,000	.....	.....	650,000	.....	.....	.....	.....	.....
Hallowell	60,000,000	.....	.....	.....	55	.....	.....	.....	.....
Lewiston	1,512,288,000	.....	3½	4,143,254	.....	.....	.....	.....	.....
Pittsfield	75,000,000 ¹	.....	.....	.....	.....	.....	.....	.....	.....
Skowhegan .....	.....	.....	30	360,000	.....	.....	.....	.....	.....
Maryland:									
Baltimore	24,824,516,074	6,680,848,140	22	68,012,375	115	.....	.....	29.77	33.29
Ea ton .....	.....	.....	.....	200,000 ¹	.....	.....	.....	.....	.....
Massachusetts:									
Boston	31,233,597,500	10,701,027,700	34.3	85,571,500	124	.....	.....	.....	.....
Brockton	990,451,721	688,767,000	69.5	2,713,566	39	39.7	322	46.28	111.07
Brookline	951,259,556	All.	100	.....	.....	.....	.....	.....	.....
Cambridge	3,794,689,680	.....	29	10,396,410	99.16	99.16	663	21.11	95.94
Clinton	220,226,100	119,562,000	54	503,300	46	46	329	128.14	205.72 ^a
Concord	179,892,000	40,004,000	22.2	493,000	76	82	420	47.00	.....
Danvers	338,000,000	.....	.....	928,000	92	.....	.....	.....	.....
Everett	993,597,000	.....	29	2,557,800	73	78	.....	58.40	.....
Fitchburg .....	.....	.....	80	4,000,000	.....	.....	.....	.....	.....
Framingham	264,040,329	.....	.....	723,398	53	67	381	90.08	165.60
Gardner	240,111,043	44,563,693	18.3	657,838	43.5	46.2	366	72.07	120.42
Gloucester	478,806,879	92,798,794	19	1,311,799	46	48	281	49.59	131.64 ^a
Haverhill	2,081,546,273	279,486,797	13.4	5,702,866	125	135	846	16.18	34.47 ^a
Holyoke	2,151,682,000	674,647,500	32	5,895,000	102	104	1,422	42.00	55.00
Lynn	2,449,199,091	.....	40	6,710,134	67.17	.....	428.56	.....	.....
Middleboro	135,074,000	57,675,222	42	370,000	75	80	359	.....	.....
New Bedford ..	2,910,369,438	1,756,230,633	60	7,973,615	78	83	599	26.84	51.55
Newburyport ..	431,481,100	53,795,300	12.46	1,182,140	80	82	335	39.05	94.75
Newton	942,735,000	621,261,000	65.9	2,582,236	63½	64.2	309	87.16	127.00
North Adams ..	1,095,000,000	77,213,022	7	3,000,000	120	128	.....	10.16	17.04 ^a
North Attleboro.	179,443,647	142,647,800	100	.....	.....	.....	.....	.....	.....
Peabody	904,496,000	573,877,666	63.58	2,472,591	145	150	890	21.03	45.27
Reading	80,845,219	49,493,042	61	221,452	37.5	39.2	152	123.50	207.69
Revere .....	.....	.....	.....	1,439,400	75	.....	.....	.....	.....
Somerville	2,153,171,500	.....	.....	5,899,100	74	74	.....	.....	.....
Springfield	3,847,830,000	1,859,664,506	48.33	10,542,000	115	116	812	35.49	58.93 ^a
Taunton	813,431,233	367,593,046	45	2,228,578	65	68.5	420	44.09	84.82 ^a
Turners Falls ..	232,000,000	30,000,000	12	635,000	91	100	700	22.00	41.00
Waltham	917,314,000	115,200,000	12.5	2,500,000	88	.....	638	54.53	76.50
Wellesley	129,312,000	84,850,000	100	354,000	47.2	47.5	277	.....	.....
Michigan:									
Alpena	827,758,768	.....	3 ¹	.....	.....	.....	.....	.....	.....
Battle Creek ..	665,000,000	478,000,000	72	1,823,000	67	74	330	27.00	50.00
Cold Water	293,232,500	.....	.....	803,370	115	.....	535	.....	.....
Detroit	33,675,017,355	12,015,302,516	35.7	92,260,822	180.4	177.3	947.8	6.12	7.50
Escanaba	648,225,000	216,000,000	33	1,755,959	.....	.....	.....	.....	.....
Greenville .....	.....	.....	.....	400,000 ¹	100 ¹	.....	.....	.....	.....
Holland	386,800,980 ¹⁰	157,562,050	40.8	1,059,729	98.5	.....	550	50.98	69.86
Howell	57,710,000	.....	.....	150,000	.....	.....	.....	.....	.....
Ishpeming	45,625,000	.....	76	.....	.....	.....	.....	.....	.....
Lansing	1,105,000,000	5,800,000	50	3,000,000	.....	.....	.....	.....	.....
Manistique	100,000,000	3,000,000	.....	.....	.....	.....	.....	24.40	.....
Marquette	780,972,000	163,443,700	.....	2,088,390	178	.....	.....	27.35	43.25
Marshall	164,719,221	.....	38½	.....	.....	.....	.....	.....	.....
Mt. Pleasant ..	.....	.....	.....	150,000	.....	.....	.....	.....	.....
Muskegon	1,279,050,374	.....	35	3,504,247	.....	.....	.....	.....	.....
Saginaw	3,498,739,723	.....	6	9,585,588	189	492	1,632	.....	.....
Ypsilanti	220,000,000	110,000,000	40	600,000	75	.....	330	0.70	1.05
Minnesota:									
Brainerd	427,947,522	.....	.....	1,172,187	150	.....	.....	30.00	42.00
Duluth	2,520,331,000	.....	66	6,900,000	85	.....	649	35.09	71.90
Eveleth	199,000,000	50,000,000	25	542,438	67	.....	.....	73.77	.....
Faribault	162,862,000	106,317,978	65	446,200	40	91	670	40.00	84.80
Hutchison	18,240,000	5,000,000	.....	.....	.....	.....	.....	.....	.....
Mankato	268,994,620	.....	100	738,000	69.5	.....	550	.....	.....
Moorhead	139,066,000	.....	.....	380,990	.....	.....	.....	.....	.....
Northfield	79,000,000	.....	.....	218,000	.....	.....	.....	38.63	63.94 ^a
Owatonna	141,310,629	19,363,781	.....	.....	64.05	47	4,310	6.75	12.00
Worthington ..	27,375,000	.....	.....	75,000	.....	.....	.....	.....	.....
Mississippi:									
Greenwood .....	.....	.....	.....	150,000	.....	.....	.....	.....	.....
Natchez	202,805,038	72,507,085	35	555,630	46	.....	459	.....	119.00
Yazoo City	292,000,000	7,500,000	10	800,000	117	133	666	28.00	30.00
Missouri:									
Brookfield	36,000,000	.....	93	98,143	.....	.....	.....	.....	.....
Butler	85,000,000	30,000,000	.....	232,000	.....	.....	.....	.....	.....
Caruthersville ..	.....	.....	.....	250,000	.....	.....	.....	.....	.....
Hannibal	541,207,642	202,707,554	.....	1,480,760	.....	.....	.....	42.74	.....
Kansas City ..	11,821,684,381	6,738,360,097	57	32,388,176	124	129	675	38.31	52.51
St. Louis	30,576,000,000	9,000,000,000 ¹	30	83,500,000	118	120	780	32.60	.....
Nebraska:									
Ashland	33,216,000	551,120	1.7	96,000	69	107	274	64.70	100
Chadron	93,900,500	66,450,000	70	257,300	83	.....	.....	.....	.....
Grand Island ..	.....	.....	100	2,000,000	.....	.....	.....	.....	.....
Lincoln	975,547,000	634,207,000	100	.....	.....	.....	.....	.....	.....
Reno and Sparks	3,451,625,000	.....	.....	9,450,000	637	740	.....	4.22	.....
New Hampshire:									
Concord	286,584,145	.....	57.59	785,162	.....	.....	.....	.....	.....
Dover	196,169,000	.....	40	537,449	40	41	280	66.16	150.00
Keene	912,500,000 ¹	.....	.....	.....	238	250	1,218	.....	.....
Newport .....	.....	.....	.....	300,000 ¹	60 ¹	.....	.....	.....	.....

For footnotes, see page 956.

TABLE NO. 2.—STATISTICS OF WATER WORKS OF THE UNITED STATES
Consumption and Cost (Continued)

Name of city.	Total for the year.	Passed through meters.	Per cent. metered.	Average daily consumption.	Consumption.			Cost of supplying water per million gallons figured on	
					per inhabitant.	Gallons per day per consumer.	per tap.	Total maintenance.	Maintenance + interest on value of property.
New Jersey:									
East Orange ...	1,155,307,600	129,848,200	11.2	3,165,200	91.2	91.5	451.3	52.54	83.57 ⁹
Kearny .....	.....	.....	100	.....	.....	.....	.....	.....	82.50 ¹¹
Madison	130,000,000	70,800,000	...	350,000	70	.....	375	.....	.....
Millville	424,000,000	.....	.....	.....	.....	.....	.....	.....	.....
Newark	14,640,300,000	6,606,000,000	45.2	40,000,000	107	107	914	26.78	77.50
New Brunswick..	1,164,757,235	.....	35	3,191,116	.....	.....	675	16.78	.....
Paterson	3,700,000	.....	26	10,000,000	80	80	.....	.....	.....
Perth Amboy...	2,096,658,007	1,058,144,500	47.5	5,744,270	136.78	.....	.....	35.53	.....
Ridgewood	300,000,000	.....	3	850,000	.....	.....	.....	.....	.....
Vineland	231,925,160 ¹²	15,653,080	...	.....	.....	.....	.....	.....	.....
New Mexico:									
Albuquerque ...	440,000,000	.....	70	1,500,000	115	.....	650	.....	.....
New York:									
Baldwinsville ...	120,450,000	.....	...	350,000	.....	.....	.....	.....	.....
Binghamton ...	2,373,748,080	.....	33	6,184,535	130	.....	.....	.....	.....
Buffalo	49,248,465,650	12,181,590,000	25	134,927,303	317	317	1,746	10.75	21.31
Canandaigua ...	309,106,800 ¹²	203,316,000	65.7	850,000	115	.....	545	.....	36.98
Carthage	146,000,000	.....	67	400,000	133	.....	.....	3.75	31.25
Catskill	261,019,532	.....	6	700,000	145	.....	.....	.....	.....
Cortland	398,533,834	91,225,000	23	1,091,874	95	121	519	19.39	52.18
Dunkirk	1,460,000,000	1,095,000,000	75	4,000,000	222	.....	800	23.00	.....
East Chester... }	.....	.....	56	3,000,000 ¹	77	78	472	93.15	.....
New Rochelle... }	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pelham .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Elmira	1,802,578,000	.....	...	4,938,500	141	.....	666	.....	.....
Fairport	42,838,000	.....	...	100,000	30	.....	160	72.00	135.80
Geneseo	104,562,000	16,100,477	15.5	286,471	138	178	538	49.27	101.19
Glens Falls	800,000,000 ¹	39,807,510	5	2,191,000	137	137	646	12.41	32.00
Gowanda	109,500,000	.....	...	350,000	.....	.....	.....	6.70	.....
Hudson	600,000,000	120,000,000	...	.....	.....	.....	.....	26.40	53.95
Jamestown ...	1,234,000,000	.....	61	.....	.....	.....	.....	14.62	29.00
Middletown ...	1,095,000,000 ¹	273,750,000	25	3,000,000 ¹	196	225	965	55.30	87.50
Mohawk	62,588,375	10,000,000	7	160,000	50	60	300	25.60	50.40
Newark	135,853,680	.....	...	372,202	53	62	.....	.....	.....
Newburgh	1,500,000,000	.....	...	3,500,000	140	.....	.....	.....	.....
N. Tonawanda..	1,714,360,300	20 meters.	...	.....	.....	.....	.....	.....	.....
Oneida .....	.....	.....	90	.....	.....	.....	.....	.....	.....
Pekskill	1,053,728,615	.....	75	3,000,000	185	.....	.....	45.00	.....
Poughkeepsie ...	962,316,000	579,471,750	100	2,636,482	82	84	564	36.00	72.00
Salamanca ...	438,000,000 ¹	25,352,814	5.79	1,200,000	200	222	.....	12.83	30.51
Schenectady ...	3,712,935,000	.....	5	10,172,425	130	.....	.....	20.00	.....
Sobray	122,000,000	75,000,000	100	330,000	64	.....	365	120.00	160.00
Troy	6,570,000,000 ¹	.....	...	18,000,000	225	257	1,150	13.09	39.12
Whitehall	325,000,000	125,000,000	20	900,000	100	.....	.....	.....	.....
North Carolina:									
Elizabeth City...	110,000,000	15,000,000	14	300,000	37	100	500	35.00	72.00
Washington ...	72,000,000	.....	40	200,000	67	.....	400	.....	.....
Wilmington ...	516,217,000	.....	50	1,350,000	49	90	500	49.00	83.80
Ohio:									
Barnesville ...	45,000,000 ¹	.....	90 ¹	.....	.....	.....	.....	.....	.....
Canal Dover...	195,000,000	.....	10 ¹	531,000	.....	.....	.....	25.00	.....
Cincinnati ...	17,541,553,859	7,293,712,404	41.6	48,059,051	126	122	937	32.39	65.97
Cleveland	23,977,196,242	19,633,325,500	83.82	65,690,949	104	106	789	15.82	40.34
Covington .....	.....	.....	100	.....	.....	.....	.....	.....	.....
Delaware	343,015,956	.....	60	1,000,000	100	120	.....	35.29	57.06
Eaton	38,460,000	23,000,000	55	140,000	44	70	184	106.00	207.00
Hicksville	60,000,000	.....	...	.....	80	133	.....	.....	.....
Leetonia	27,975,000	.....	...	75,000	.....	.....	.....	160.40	.....
Portsmouth ...	900,000,000	.....	...	2,500,000	.....	.....	.....	.....	.....
Salineville ...	45,625,000	3,680,000	6.7	125,000	32	57	260	40.82	.....
Toledo	6,058,843,760	3,635,306,256	80	16,599,572	81	118	664	47.00	60.45 ⁹
Washington ...	180,843,100	.....	...	493,460	99	.....	.....	.....	86.90
Waverly .....	.....	.....	50	.....	.....	.....	.....	.....	.....
Youngstown ...	3,065,000,000	.....	27	8,398,079	.....	.....	.....	.....	.....
Oklahoma:									
Davis .....	.....	.....	5	40,000	.....	280	.....	200.00	.....
Lawton	300,000,000	150,000,000	50	.....	.....	.....	.....	.....	.....
Shawnee	300,000,000	200,000,000	100	900,000	90	100	300	110.00	112.50
Oregon:									
Portland .....	.....	.....	...	.....	83	.....	416	.....	.....
Pennsylvania:									
Allentown	2,760,053,581	170,560,100	6.2	7,558,795	142	143	595	16.13	20.21
Bradford	730,000,000	.....	0.1	2,000,000	117	121	527	.....	.....
Carbondale ...	1,825,000,000	.....	40	5,000,000	200	.....	500	.....	.....
Franklin	219,000,000	4,400,000	...	600,000	.....	.....	.....	.....	.....
Harrisburg ...	2,926,652,350	2,213,419,400	75	8,018,224	114	114	471	17.15	27.36
Huntingdon ...	292,000,000	.....	...	800,000,000	.....	.....	.....	.....	.....
Indiana	150,000,000	75,000,000	50	400,000	.....	.....	.....	.....	.....
Lancaster	2,539,858,480	810,540,000	...	6,958,516	139	.....	.....	3.75	6.00
McDonald	158,759,000	.....	98	435,000	34 ¹³	34 ¹³	921	44.00	92.67
Media	190,902,004	.....	...	524,389	93	.....	.....	26.43	60.52
Meyersdale ...	.....	.....	...	250,000	70	.....	.....	.....	.....
North East ...	.....	80,000,000	50	450,000 ¹	.....	.....	.....	20.00	50.00 ¹
Philadelphia ...	116,044,866,000	10,820,314,750	9	317,930,000	201	212	1,000	19.60	45.00
Reading	4,914,990,345	1,667,006,008	33.9	13,428,935	136	136	597	13.84	54.02
Shenandoah ...	639,000,000	45,000,000	...	1,750,000	88	.....	439	46.95	.....
Rhode Island:									
Westerly	290,624,800	.....	...	794,000	58	72	410	45.03	90.68
Woonsocket ...	547,811,000	458,580,000	83.7	1,501,000	34	34	447	42.27	.....
South Carolina:									
Florence	109,500,000 ¹	65,400,000 ¹	60	300,000	37	71	355	80.00	113.00
Orangeburg ...	90,000,000	20,000,000 ¹	...	250,000	.....	.....	.....	140.00	167.00
South Dakota:									
Huron .....	.....	.....	...	900,000	.....	.....	.....	.....	.....
Mitchell	93,994,260	20,000,000	22.3	261,095	35	74	533	64.00	85.00
Tennessee:									
Memphis	4,758,376,464	1,665,450,000	35	13,036,648	72	72	614	45.47	71.53
Texas:									
Denton .....	.....	.....	65	.....	.....	42	.....	.....	.....
Houston	2,125,981,520	1,051,388,765	82	5,868,466	53	.....	.....	36.97	62.54
Laredo	300,000,000	63,000,000	22	800,000	50	.....	800	57.00	92.00
Utah:									
Salt Lake City..	8,030,000,000	.....	4	22,000,000	236	244	.....	.....	.....

For footnotes, see page 956.

TABLE NO. 2.—STATISTICS OF WATER WORKS OF THE UNITED STATES
Consumption and Cost (Continued)

Name of city.	Total for the year.	Passed through meters.	Per cent. metered.	Average daily consumption.	Consumption.			Cost of supplying water per million gallons figured on	
					per inhabitant.	Gallons per day per consumer.	per tap.	Total maintenance.	+ interest on value of property.
<i>Vermont:</i>									
Bellevue Falls.....		22,000,000	19						
St. Albans.....	400,000,000 ¹		10	1,100,000	175 ¹	183	1,100	10.00	45.00
<i>Virginia:</i>									
Charlottesville ..	540,000,000	325,000,000	42	1,500,000				12.50	
Farmville	90,000,000	4,000,000	4.5	250,000	83	167	715	40.00	67.00
<i>Washington:</i>									
Hoquiam				1,500,000					
Seattle		6,142,000,000	80	25,000,000	100		650		
Spokane	11,338,518,240		20	31,462,550	287				
<i>West Virginia:</i>									
Sistersville	273,750,000	20,000,000	...	750,000				14.60	
<i>Wisconsin:</i>									
Algoma	21,659,153	1,516,900	...	59,340	29	64	317	137.80	
Ashland	416,876,090	104,043,000	25.3	1,142,126	95		601	81.61	165.04
Berlin	67,880,000		30	180,000					
Eau Claire.....	750,000,000 ¹	115,000,000	...		208		740		30.00
Ft. Atkinson ..	51,779,820	51,779,820	100	141,750	35		259		154.00
Neillsville	13,500,000			37,500					
Milwaukee	16,343,653,340	10,137,113,200	62	44,777,132	114	112	796	15.08	37.08
Ripon	171,422,735	11,519,000	6.7	469,651	123		664	49.30	89.60
Superior	692,750,000	245,353,000	35.4	1,897,000				6.37	7.78
Watertown	297,877,264	183,538,805	61	816,102	62	120	699	30.00	
Wausau	600,000,000	40,000,000	6	1,650,000	100		725	24.00	44.00
Wauwatosa	60,000,000	43,000,000 ¹	95	170,000				44.08	

¹Estimated only. ²All water measured at filter plant. ³Domestic only; factory 55 per capita. ⁴Including filtration. ⁵Domestic consumption only. ⁶Bonded indebtedness used for value. ⁷Includes railroads; 51 excluding railroads. ⁸Figuring 4% on net cost of construction. ⁹Interest figured on bonds as value. ¹⁰Quantities based on pump displacement; beginning about June 18 all will be measured by station meters. ¹¹Amount paid to N. Y. & N. J. Water Co. ¹²Calculated from pump counter; slip unknown. ¹³After deducting use by mines and railroad.

(Continued from page 949.)

two soften the water; but 239 do not treat the water in any way.

Of the cities listed 76.6 per cent. use meters to a greater or less extent; 10 per cent. of these metering all consumers, and 39 per cent. metering 50 per cent. or more.

About 46 per cent. of the consumption rates reported exceed 100 gallons per inhabitant; the amounts varying from a minimum of 8 gallons (16 per consumer) to 637 (740 per consumer).

In the consumption figures of this table it would appear as though the quantities given were in some cases estimates—often mere guesses, and careless ones at that; one instance being a city which reported 6,000 population supplied, a consumption of 42½ gallons per day per consumer, 100,000 gallons per day total consumption and 365,000 gallons total for the year; no two of which figures are consistent. An inspection of the average daily and total yearly consumption figures shows more than half of these given in round numbers, which would generally indicate estimates. How many of these are based upon pump counter records, with no allowance—or a mere assumed one—for slip, is not known. It would seem, in fact, as though the entire matter of quantity of water was considered of no importance by the majority of superintendents; in spite of the fact that without knowing this they have no basis for calculating the efficiency of operation of the plant as a whole or in detail.

The figures given in this table, in annual reports of water departments, etc., are the best which we now have; but it is suggested that their value would be increased if it were stated in each case whether the figures were from actual measurement, from pump counter calculation (with information as to slip allowed, and basis for same) or from mere estimate.

When we come to the figures of cost we find such extreme differences as to indicate the highest probability that they were not all based upon uniform assumptions. In the case of interest on value of property this is not so much to be wondered at, as what constitutes "value of property" is still a mooted question. The New England Water Works form used "interest on bonds" in place of interest on value, and many of the replies given in our table are on the same basis; but this seems to us to be of no particular value as information, since the amount of outstanding bonds seldom equals the value of the plant, and is an index more of past payments made for redeeming bonds than of present

maintenance costs. As a matter of fact, we think that the form should be changed and this item made to include all overhead charges, with a fairly complete definition of just what is held to be comprised by this term.

The term "maintenance" also should be clearly defined. It hardly seems probable that a plant which pumps its supply and filters it through mechanical filters could have maintenance charges of \$4.32 per million gallons, while another in the same State which does not treat its water should have an expense of \$200 per million gallons, both on the same basis of calculation. One plant, which pumps and serves 4,000 population, reports its total annual maintenance charge to be \$954; and another of about the same population, which both pumps and filters, reports a maintenance charge of \$117,343 a year, or \$22.56 per capita of the total population. The former is unusually low, but complete figures are given by this city for consumption, a considerable percentage of which is metered, and it is possible that this figure is correct. But that a town of 5,000 spends \$117,000 a year for maintenance seems improbable.

But in spite of these anomalous figures we believe that most of those given in the table are reliable and furnish not only information which will prove valuable to many waterworks men, but also confirmation of our belief that most waterworks superintendents could fill out the blank in question without altering their present method of accounting and reporting to any considerable extent; and that most of those who could not do so are operating their plants in a haphazard way, without any definite records of either the physical features of the plant or the efficiency with which it is being operated.

Duplicate Systems in Niagara Falls

NIAGARA FALLS, N. Y., has for some years been served by a private water company, but about two years ago the taxpayers voted bonds for a pumping station and rapid sand filtration plant, both of which are now in operation. The city offered to buy the plant of the private company, or to furnish it with filtered water at actual cost, so that the citizens might have purer water, but both propositions were rejected. The taxpayers then voted to lay mains paralleling those of the private company, and this is now being done, mains being laid on both side of each street. Fire hydrants are connected to the city mains as these are laid (about 800 have been connected so far), and such consumers as request are changed from the private to the city mains. The present income is over \$5,000 a month.

NEWS OF THE MUNICIPALITIES

Current Subjects of General Interest Under Consideration by City Councils and Department Heads—Streets, Water Works, Lighting and Sanitary Matters—Fire and Police Items—Government and Finance

ROADS AND PAVEMENTS

Prizes for Roadbuilders

West Plains, Mo.—A road-working campaign of three days from West Plains to the Fruitville road was concluded when several hundred dollars' worth of merchandise and cash were distributed as prizes to the best workers. The twelve miles was divided into seven divisions, with an overseer and timekeeper over each crew, the entire force being under the command of Col. Jay L. Torrey and County Highway Engineer T. Taylor. Miss Della Smith, of Fruitville won an imported china set, donated by Col. Torrey to the young lady who had the most beaux working. Farmers organized an improvement association to keep up the road, beautify farm homes, paint and whitewash buildings, cut underbrush and make the homes as attractive as possible. The mayor, president of the Commercial Club, county candidates and business men from West Plains assisted.

Work on State Road Started

Seneca Falls, N. Y.—The Free Bridge road across the Montezuma marshes from Auburn to Seneca Falls has been closed to all vehicles. F. E. Colvin has been engaged by F. A. Brotsch & Son to take charge of the State road building on the contract, and he has started work with a large force of laborers and a score of teams. The first work to be undertaken is the filling up of the roadway across the marsh. The contract calls for 2,500 feet of fill from where the road crosses the barge canal toward this village. The road must be raised more than twelve feet near the canal. Contractor Brotsch has purchased a piece of land several acres in area to be used as material for raising the road above high water level. Approximately 8,000 cubic yards of material must be moved before even the bottom course of the macadam roadway can be laid. Mr. Colvin said that he expected to have the fill completed in two weeks, but it will be some time before the road can again be opened to travel. Closing the highway will divert all travel to the Cayuga-Bridgeport ferry.

Work on Cutting Away Hump Progresses

Pittsburgh, Pa.—The disposition of dirt and rock from the cutting of the "Hump" is one of the complicated problems that confronted Booth & Flinn, the contractors in charge of the work. The illustration shows how, in order to facilitate this, a huge platform was erected over the Panhandle railroad's Try street yards, opposite the Fourth avenue depot. There will be accommodations for eight wagons at one time, with trapdoor facilities for dumping the dirt from the wagons into the waiting gondola cars below. Permission was secured to take out a section of the fence along Forbes street to allow wagons access to this temporary platform.

Road Work Must Be Supervised by Engineer

Topeka, Kan.—To prevent the wasting of the money of the people in the Kansas counties where improved road work is to be carried on this year a county engineer must be appointed to supervise the work. If the county surveyor is not competent to handle the work or has too much work to do an additional engineer is to be selected. John S. Dawson, Attorney General, in an opinion regarding the appointment of county engineers, holds that every county must have an engineer before road work can be done and before money collected as taxes for special road building can be spent. There are about 30 counties in the State which have voted money for good roads, varying in amounts from \$10,000 to \$60,000 for the year.

Their Beaux Must Be for Good Roads

Macon, Mo.—Things are getting to such a pass in this section that young women will not receive young men in their homes unless the applicants can produce a card showing they are members in good standing of some good roads association. The latest organization is the Macon Good Roads Association, organized this week. It is composed of business men, doctors and several editors. Each man pledged himself to help the work with dollars, or with shovel and pick if necessary. Harry M. Rubey is president; Theo Reichel, vice-president; Fred H. Tedford, secretary; Lee Miller, treasurer.

Oiled Roads Good After Rain

Port Jervis, N. Y.—Commissioner of Streets and Sewers Durfey has begun the work of sprinkling oil upon the streets, beginning with East Main street. The street dust was first swept off the street and carried away, and oil applied by the sprinkler; over this a coating of crushed stone screenings was spread. The steam road roller was then put in service and the screenings rolled in the oil making a smooth surface and presenting a finished appearance. The rain which fell after the road had been sprinkled seemed to have no effect upon the oil and automobiles and other vehicles may traverse the finished street without marring them.

Repair Oshkosh Streets According to Contract

Oshkosh, Wis.—The J. Rasmussen & Sons Company has begun the repair of tar macadam pavements according to the requirements of the guarantee which was made a part of its contract for the construction of such pavements. When the company finishes its repairs on the tar macadam pavements it will start repairs on the asphalt and brick pavements that it constructed within the last five years. In acknowledgement of his notice to the Barber Asphalt Paving Company that it would be expected to make repairs to the asphalt pavements it had constructed on certain streets, Mayor Mulva has received a response stating that a representative of the company would be here soon to take up the matter of such repairs with the City Council.



Courtesy Pittsburgh Dispatch.

PLATFORM CONSTRUCTED FOR DISPOSITION OF HUMP DIRT.

Creosote Blocks Laid on Albany Streets

Albany, Ga.—Street paving, with creosoted wooden block and vitrified brick, is going forward at a rapid pace in Albany. The paving of Pine street, between Jackson and Washington, will soon be finished, and work has commenced on Broad street, from Washington to the Flint river bridge. Wood block is being used on Pine street, and vitrified brick will be used on Broad. City Council has also decided to pave Jackson street, between Pine and Broad, with wood block. The paving on the block on Pine from Washington to Front, in the wholesale district, is also under consideration by council. If this work is done at this time it will practically complete the paving of the streets in Albany's business section, considerable portions of Washington and Broad having been paved in previous years.

Storm Makes Natural Bridge

Houston, Tex.—A recent storm made a natural bridge at the corner of Stuart and Louisiana streets, when the water emptying into an excavation made by the gas company for the repairing of a broken main washed out the dirt beneath the street for a distance of 30 square feet, leaving the bitulithic paving laid some three years ago to stand as a natural bridge for the accommodation of the traffic. The damage done was slight, only in that it necessitated opening the paving for some distance that the men might be able to make the fill. It took the combined efforts of two men wielding heavy sledges on a chilled steel cutter in order to make the opening. The edges of this opening were measured by some interested citizens, who found that there had been no appreciable wear in the three years of use given this particular street, upon which the traffic is extremely heavy. The paving without support of any kind had stood under the heavy traffic and automobiles which are constantly passing over it.

SEWERAGE AND SANITATION

Wins by Swatting Two Thousand Flies

Maryville, Mo.—George Williams, a diminutive negro boy, has won the \$5 gold piece offered by George B. Baker, president of the Real Estate Bank, in the fly "swatting" contest. Williams had 2,100 flies to his credit in the counting, which was under the direction of Mayor A. S. Robey. More than 10,000 flies were brought in by the contestants as a result of the day's swatting.

Twenty Million Dollar Sewer System Under Construction

Long Island City, N. Y.—One of the most prominent features of the immense development that is now taking place in the Borough of Queens is the rapid progress being made in the construction of a gigantic system of big outlet and secondary sewer mains which when completed will provide, with those already finished and in operation, for an area of 30,000 acres, and for an estimated population twenty years hence of a million and a half persons. The cost of the completed work will not be far from \$20,000,000. As these sewers must precede every highway improvement work is being pushed on them with all possible despatch. The rapid flow of population into all sections of the borough makes rapid progress necessary, and it is impossible to keep abreast of the demand. In large sections, where the outlet mains are approaching completion, the residents even of the most congested localities in many cases have failed to make any move in the way of applications to the local boards for the initiation of proceedings for the installation of lateral mains, and in spite of the fact that they are earnestly asking for relief from the present intolerable conditions caused by the flooding of large areas with surface water and installation of thousands of cesspools, they will find that relief delayed because they have apparently forgotten that the initiative rests with them and that under the provisions of the charter the local board replaces the old fashioned town meeting in that it is the body where every needed request can be made and the body that initiates proceedings, for public works. Borough President Connolly is, however, trying to help out the property owners in this matter and is sending blank petitions to various localities for circulation for signatures and proceedings will be begun at an early date for hundreds of miles of lateral mains in the borough.

Over 100 Feet of New Sewer Collapses

Lynn, Mass.—Over 100 feet of the new sewer on Broadway place has collapsed. The sewer is a 24-inch pipe sewer, laid on a structure of planks and piles. The ground about the sewer is made land, having little lateral stability, and it is supposed that the pipes collapsed for want of support. The new pipe will be reinforced with concrete.

Clovis Begins War on the House Flies

Clovis, N. M.—At a meeting of the executive committee of the Chamber of Commerce, a campaign was inaugurated against the housefly, and war has been declared. The Chamber of Commerce is offering \$100 in cash prizes as follows: Any person under 18 years of age may enter the contest which is to be on from June 10 to June 22, and the person delivering to the Chamber of Commerce the most dead flies during that period is to receive a cash prize of \$17.50; second prize, \$12.50; third prize, \$8; fourth prize, \$6; fifth prize, \$4; sixth prize, five each, \$3; seventh prize, six each, \$2; eighth prize, 25 each, \$1; a total of \$100 in 41 prizes.

Baltimore to Use Hyperchlorite

Baltimore, Md.—For prevention of typhoid fever during the high typhoid months—from May to November—the Board of Estimates approved Water Engineer Whitman's request to be allowed to use \$15,000 of the Gunpowder River improvement loan for the purification of Baltimore's drinking water by the use of alum and calcium hyperchlorite. Purification stations will be established at Lake Montebello and Lake Hampden, the sources of the city's water. The alum will be placed in the water as it enters the reservoirs and the hyperchlorite as it passes out. As the result of the purification of the waters with these chemicals the typhoid and other germs will be absolutely eliminated and the water cleared to a high degree. That no taste of the chemicals will remain is the positive statement of Engineer Whitman.

State Aid for Public Health

Rochester, Minn.—The City Council has accepted the offer of the State Board of Health and the women of the Civic League to employ a permanent health officer for one year, the State Board of Health to pay \$1,000 and the Civic League and the city \$1,000 each to defray the expenses of the health department. A few weeks ago the State board made its offer of \$1,000, and the Civic League offered to assume the entire responsibility of the balance of the expense if the city would appoint a health officer to be named by the State board. The proposition was rejected by the council. In the face of an impending epidemic shortly after Dr. C. H. Mayo was appointed health officer and a member of the Mayo staff has given his entire time to the health work—a practical demonstration of what a health officer can do in an impending crisis. The offer of the State board having been turned down by other cities in the State, again was offered to Rochester, although the city must now stand \$1,000 of the financial burden. A public health officer will be engaged as an assistant to Dr. C. H. Mayo, who continues as health officer, and the entire time of the assistant will be devoted to health matters. The result of his work will be used in bringing pressure to bear upon the next Legislature to offer State aid to any city or community which will engage a specialist on public health as a permanent health officer.

WATER SUPPLY

Uncovered Reservoirs Will Save City \$40,000

Dallas, Tex.—Anxious to save taxpayers' some \$40,000 the city commission at a conference with James H. Fuertes, hydraulic engineering expert, decided that the reservoirs to be used in connection with the filtration plant shall be left uncovered. "This will save between \$40,000 and \$45,000," said Water Commissioner Nelms. Mr. Fuertes expressed the opinion that the water can be kept clear and clean without covering the reservoirs. However, the plant will be so constructed as to allow covering the reservoirs if necessary. Much of the conference was taken up by the problem of conserving the water while the reservoirs are being cleaned out. It was decided to use the west reservoir while the east is being cleaned and vice versa.

City Promotes Man Who Sells Machinery

Los Angeles, Cal.—Because E. W. Bannister last month sold \$25,000 worth of old machinery on the aqueduct at a handsome profit, the aqueduct advisory board decided to transfer him from the position of assistant aqueduct engineer at a salary of \$250 a month to that of chief sales engineer at a salary of \$300 a month. Several firms have been bidding for the right to sell this character of material for the aqueduct management. Eight per cent. of the gross receipts has been offered by one firm. The advisory board has decided, however, that it can make more by having its own sales engineer.

Use Electricity at the Watts Plant

El Paso, Tex.—Electricity is now being used for pumping water at the Watts plant, from the well there into the city mains. Nearly 3,000 gallons per minute can be pumped with the 400 horsepower electric pump which is being used. The old steam pumps were good for only 1,800 gallons per minute. The new pump, although of only 400 horsepower, is said to have developed 100 horsepower in excess of that figure, which necessitates the use of 2,200 volts of electricity. Steel for the completion of the brick and concrete structure which is to cover this new pump will soon be on the ground and construction work will then be resumed. This new building is to be reinforced with heavy steel beams and is to have a concrete roof. When the building is completed the pump will be permanently installed, its present location being merely temporary.

State Reports on City's Water Supply

Michigan City, Ind.—Reports from the State Board of Health upon the city's water supply, recently forwarded by the city board of health, have been received and shows the water with the hypochloride of lime treatment to be satisfactory. The city board sent three samples for analysis. Two were taken at the water works before the purification plant was started, and the third was taken from a city tap after the water had been treated. The first two samples were from the old and the new intake. The analysis showed both samples to be musty, the old intake sample showing the presence of colon bacilli, while the sample from the new intake showed gases present forming bacteria. With the hypochloride of lime treatment the water shows no colon bacilli and is declared by the State board to be of a satisfactory quality.

New Water Works Well Completed

Deming, N. M.—The new water works well is now in operation. The water was pumped first onto the ground until it cleared of sand, and was then sent into the standpipe. It is now delivering into the standpipe 400 gallons of water per minute, the lift at its greatest being 160 feet. The pump is an 18-inch American turbine, four-stage, and it is operated with a 35 horsepower motor. The new well was put down 160 feet east of the old well, which, due to defective casing, has caved in, shutting off all save the upper stratum. The pumping of the new well does not lower the water in the old one an inch. The well was put down and the complete installation made by Messrs. Ely & Dymond. The water stands in both these wells at just 53 feet, the same level that the water stood 10 years ago, when the old well was first put down.

New Pump Is Money Saver

Rahway, N. J.—As a money-saving investment to the city, the new pump installed at the water works continues to exceed expectations, according to reports presented at the meeting of the Board of Water Commissioners. In the report of Engineer Gage it was shown that forty tons of coal had been saved, amounting to about \$150, during the month of May. Another investment by the board which is paying good dividends is the independent lighting system installed at the works and about the grounds. The expense has been reduced to \$6 per month, whereas the board has heretofore paid from \$18 to \$27 per month for lighting the place. As it would cost but little to install and operate an electric sign near the top of the tall standpipe, the board is considering the placing of a sign "Rahway," in that position. In the report of Bacteriologist Earle B. Phelps, the filters were shown to be doing efficient work, removing 99.43 per cent. of all bacteria during the past month and 100 per cent. of the bacteria coli.

A Unique Celebration for Reservoir Opening

Spokane, Wash.—Unique and original is the celebration planned for the latter part of June, when the municipal reservoir at Lincoln Heights, Spokane, holding 24,000,000 gallons of water, will be dedicated by Mayor William J. Hindley and members of his cabinet. A feature of the dedicatory exercises will be an open-air dance in the basin, the grand march being led by David C. Coates, Commissioner of Public Works, and Marguerite Motie, the official "Miss Spokane," the latter being accompanied by six attendants in Indian costume. After a series of dances, in which it is expected more than 2,000 couples will participate, the huge basin will be filled. The reservoir, which is built of concrete, is to be decorated for the occasion with flowers and plants, which will be sent to local hospitals and asylums at the close of the festival. The basin will be scrubbed with sandstone and brick at the close of the dance and before it is filled with water from the mountain springs. The Department of Public Works has charge of the arrangements.

Improvements in Water Supply

Council Bluffs, Iowa.—With the completion of the big new settling basin for the city water department at Thirty-seventh street and the river a number of devices are to be put in operation whereby the water supply for the city may be made clear and more pure. The new basin, with its three divisions and a weir between each basin, will help considerably, but in addition to this a new intake and a new outlet, with numerous improvements on the Broadway reservoir, are to be built. The present intake, extending out into the river, seems to be too near the bottom of the stream, as it often draws in stones that are so large that they must be taken directly from the bed of the river. Sand, by the ton, is also drawn through the suction pipe, and it is hardly possible to clarify such water. The plan which Superintendent Etnyre is working on involves the installing of a new intake which is to extend out farther into the stream, to be placed above a mat which will protect the bottom of the river from the suction and to have the end of the intake bell shaped so that the velocity of the water in flowing into the pipe will not be so great. This will eliminate a great amount of the coarser residue which is drawn into settling basin at present. The new basin is to be divided by division walls, the shape of a "T." The cross will form the south wall of the north division, which is to be the intake of the reservoir, the water entering this section first after passing through the pumps and the station. It will then pass over a weir into the section of the basin east of the central division and from there will cross another dam into the third and west basin. It will then be pumped into the Broadway station, going in at the west division of that reservoir. After passing around three sides of this, it passes into the second division, over a series of ridges, so that the stream is not more than two or three inches deep. This gives the water a thorough aeration, killing any germs that might still exist in the water. This process is repeated between the second and third basins and the water is thrown into the third section so that it must make the entire circumference of the basin before it passes out to be pumped into the main where it is carried uptown. While in the Broadway reservoir it is subjected to a solution which precipitates the impurities, causing them to settle to the bottom. When the new system is in operation it is thought that the water which at present resembles an opaque glass in transparency, will be as clear as spring water. Another apparatus which is to be put in place to assist in securing the best and clearest water is a new floating outlet valve, from the river basin to the Broadway reservoir. The water which will pass through the main between the two points will be drawn from the bottom as is now done in the present system. The water at the top is always the clearest and when the water is taken from the bottom it is hardly possible that it can be free from residue. The work on the river reservoir is progressing fast. Three walls have been completed and workmen are now engaged on the west side. The foundations for the partitions have also been laid and it is expected that all of the concrete work will be finished by July 1. A gate house is to be constructed at the intersection of the two dividing walls, where the valves for the intake, outlet and drainage pipes will be operated.

Greeley Completes Filter

Greeley, Colo.—At a cost of \$13,000 Greeley has completed a filtration basin at the head of its water system.

No Leak Found in Gallitzin Mains

Gallitzin, Pa.—As a result of an investigation made by officials of the Summit Water Supply Company here, meters will be placed upon the supply of water that has been going into certain Gallitzin buildings. The Summit Water Supply Company furnishes water to the south side of Gallitzin and charges the borough according to meter. The meter has been running wild recently, the charges being more than doubled and gradually growing larger. It was at first thought there was a serious leak in the mains below the streets, but the investigation conducted failed to reveal any leaks. The water was shut off at various valves throughout the town and the meter watched closely. It is now certain that some people who did not have meters used most of their water from other sources until just recently, when they began drawing upon the borough supply with noticeable results. The borough councilmen do not think these people were stealing water, but simply used more than they realized.

New Reservoir Said to Have Serious Leaks

San Francisco, Cal.—Serious leaks in the Twin Peaks reservoir of the high pressure fire protection system, the full extent and the real cause of which have not yet been officially determined, caused Mayor Rolph to summon a council of the city officials at the Mayor's office, at which startling disclosures were made and it was charged that the expansion joints, which are filled with asphalt in the sides and bottom of the reservoir, are faulty in principle. The pressure of the water forces the asphalt out. There are two miles of these joints, which, according to the statement of the contractors, Healy & Tibbitts, cannot be made permanently tight without a complete change of the plan. The trouble came to a focus through the refusal of the Board of Works to make Healy & Tibbitts their final payment of \$49,000 until they stopped the leaks. The contractors claimed that they had carried out the specifications in detail, and that the leaks were not their fault. They then carried the matter to the Mayor.

Offers to Give City Boulevard Around Reservoirs

Los Angeles, Cal.—The artificial lakes in San Fernando valley, made through the work of the city in impounding water from the aqueduct, are to be made beautiful. A boulevard sixty feet wide, costing \$40,000, running from a point one-fourth of a mile north from Sylmar station along the two reservoirs and joining Huntington avenue in San Fernando, is to be constructed. The plans for the boulevard have been submitted to the Board of Supervisors and taken under advisement until such time as the route can be inspected. In the event the board does not look with favor on the project, Fred L. Boruff, the man who submitted the plan and who offers practically all of the necessary right of way, will construct the boulevard himself. The boulevard from where it leaves the county road system to San Fernando is six miles long, and as proposed would run within fifty feet of reservoirs number one and two, giving practically five miles of water front drive in one of the most picturesque settings that could be desired. The plan of the road shows it sixty feet wide, with parkings on each side to be planted with trees. On the water side of the road, Boruff in making his plans has left fifty feet, though in spots the shape of the bank of the reservoir and the plan of the road leave a distance of approximately twenty acres that will be transformed into a public park and picnic ground. Mr. Boruff, who has been a member of the National Good Roads Association for twenty-five years and who has constructed roads in many States, intimated that later a plan would be taken up for continuing the road through the hills of Pasadena. Speaking of the plans before the supervisors, he said: "I have submitted the plans and blue prints to the supervisors and have offered them the right of way gratis. I am waiting to see what they do with it and if they are not inclined to look on it with favor I will build it myself and make them a present of it. The cost should be close to \$40,000, making one of the most beautiful drives in the country." It is understood that the city has offered Mr. Boruff enough trees from the city nursery to cover all needs in the parking.

Will Drill Oak Cliff Well Deeper

Dallas, Tex.—The new Oak Cliff Trinity sands well is now reported to have pierced the sands for more than forty feet and is flowing about 100,000 gallons per day. Water Commissioner Nelms expects that the well will go about 200 feet through the sands and thinks it will be flowing more than 1,000,000 gallons per day within ten days. It is now more than 2,500 feet deep. The Fair Park well is 2,475 feet deep and work has started putting in the well casing. The drill is now at the top of the Trinity sands. Mr. Nelms considers that Faucett & Hall, contractors on this well, have done unusually fast work. The well was started at the same time with the Oak Cliff well and the latter is at 1,558 feet. The Fair Park well is now practically as deep as the other well.

STREET LIGHTING AND POWER

Company Demonstrates Double Arc Gas Lamp

Haverhill, Mass.—The Haverhill Gas Light Company has installed a double arc gas street light of the most modern design and the lamp is now burning every night for the purpose of demonstrating to the members of the City Council, the Haverhill Advertising Club and Board of Trade what can be done with gas street lights of high candle power. The lamp post itself is of extremely ornamental design and has an ornamental top extending about 15 inches on either side of the post, from which are hung the two gas arcs with their round globes. This lamp has been tested out and operated elsewhere for over a year, so it is known that the lamp is not experimental, but will give good results under any operating conditions. The proposition for street lighting which the Haverhill Gas Company will very shortly submit to the municipal council will include a figure on this lamp in case the city decides that this light is adapted for the purpose of general street light illumination.

For Boulevard Posts

Grand Rapids, Mich.—The Association of Commerce has turned over to the city treasurer the sum of \$6,175.12 to pay for boulevard posts to be installed soon on city streets. There will be 145 posts located on West Bridge street near Monroe avenue, on Monroe avenue from Michigan street to Fulton street, South Division street to Island street, Fulton street to Sheldon street. The posts on South Division street will be placed on the west side of the street and to the alley back of the Livingston Hotel on the east side as far as the boulevard.

Underground Conduits Will Be Costly

Pittsburgh, Pa.—According to a statement made by Robert S. Orr, of the Allegheny County Light Company, to the Public Service and Surveys Committee of the Council changes in the service lines of the company necessitated by public improvements in various sections of the city, either under way or about to be completed, will aggregate over \$300,000. This is for the construction of underground conduits. According to Mr. Orr, the amounts are divided as follows:

Cutting of the hump.....	\$63,550
Second avenue improvement.....	20,500
West Carson street.....	103,180
Northside flood streets.....	36,017

Total \$223,247

Mr. Orr said also that in addition to this absolutely necessary work, the company is expending \$91,470 in the West End district in replacing the old pole system with underground conduits. This will raise the company's expenditures to \$314,717. For this reason, leniency was asked in the passage of an ordinance now under consideration that will mean an additional outlay for similar work in the West End district if enforced immediately. The ordinance provides that all wires on Main street from West Carson to Mansfield streets, and on Wabash street between Steuben and Independence streets be placed underground. To do this work, Mr. Orr estimated, would require an outlay of between \$14,000 and \$15,000 on Main street, and \$12,000 on Wabash street. He declared also that the service in that district was hardly profitable enough to justify the expense at this time.

Board Approves Plan of Street Lighting

Paterson, N. J.—Having received the approval of the Board of Works, the Market Street Business Men's Association will appear before the Board of Finance to ask that a scheme for the ornamental and better lighting of Market street between the Erie station and Main street be put in effect in this city. The plan includes the substitution of a series of twenty-two tungsten clusters for the present eight arc lights. The clusters will contain five lights each, the cost of maintenance will be about the same as is now charged for the eight arc lights. Commissioner Cooke said he favored a plan similar to that of Poughkeepsie, N. Y., where the same ornamental posts were used also for the purpose of supporting the trolley wires. The cost of installation of such a series of ornamental street lamps would be about \$18,000 for bronze posts and \$9,000 for iron posts. One objection the Finance Board will probably have to the proposition will be the fact that the city will be paying for poles that now the Public Service is compelled to install on its own account.

Galveston Builds Immense Electric Sign

Galveston, Tex.—The work of constructing the concrete base for the huge slogan sign of Galveston on the beach front at the junction of Twenty-fifth street and the seawall boulevard has begun. The contract for the ornamental base, consisting of a series of arches, has been let to Kelso & Vautrin on their bid of \$1,000, of which amount the city of Galveston pays \$499 and the Galveston Commercial Association \$501. The work is to be finished within twenty-five days. The foundation will be of reinforced concrete arches of the following dimensions. Nineteen feet in width, fifty-six feet in length and nineteen feet above the level of the seawall. The long side of the foundation, which will face the boulevard and the Gulf, will be composed of two arches, each twenty-five feet wide, while the arch over the seawall and walk will be sixteen feet wide and nineteen feet high. The slogan sign, which will contain 3,000 electric lamps, will be erected upon a frame of steel seventy-five feet long and fifty feet high. The design has been described often and will present one of the most magnificent electrical displays in the United States. The plan upon which the sign is designed and constructed consists of a series of cubical steel frames six feet square, set in tiers. The entire sign is composed of three series of six-foot frames, making the framework a mass of braced and supported rods of heavy steel eighteen feet from front to back. The letters will be of metal heavily plated to withstand the effects of the salt air, and will be fastened with heavy bolts to the frame. The three thousand lamps which make up the gigantic sign will be five watt tungstens.

City to Supply Light at Reduced Cost

Watertown, Wis.—A municipal lighting plant for Watertown has been discussed before the City Council by C. J. Atkinson, who stated that if the city installed such a plant it could furnish current for a system of 250 arc lamps at practically \$39 per lamp. The figures he presented follow:

FIRST COST.

Two engines, 2 producers, 100 h. p. each, 2 A. C. generators, switchboard, piping and starting machinery, etc.	\$16,700
Building, foundations	1,800
Total	\$18,500

OPERATING EXPENSES.

Interest on investment at 6 per cent.	\$1,100
Depreciation or repairs at 6 per cent.	1,100
Coal	1,836
Labor, 2 men, one at \$60, one at \$90.	1,800
Oil	150
Stores	100
Total	\$6,106

This equals \$24.40 per lamp per year for current delivered to mains. To this amount must be added for all night service the cost of the lamps, mains, etc., and the upkeep of the plant which would bring the cost as estimated by him to \$38.80 per lamp. The matter will be gone through with more thoroughly by the lighting committee of the council.

West Glendale Soon to Have New Lights

Glendale, Cal.—City trustees have adopted a resolution ordering the new street lighting system for the recently annexed territory on the west. The city electric light system now is being extended into this territory. All poles and wires are being placed in the alleys, so as to keep the streets free of all obstructions. The street lights are to be placed on iron standards, and all wires feeding them are to be put under ground. The standards will be from 200 to 250 feet apart, and will alternate on both sides of streets. The territory, which is about one square mile, has 23 streets, and will be lighted by about 190 standards. Part of the cost of these street lights will fall to the city, the remainder being assessed against the property in the districts to be lighted. This section will be unique from a street lighting standpoint. While many single streets have adopted this type of lighting, it is unusual to find so large a territory lighted this way throughout.

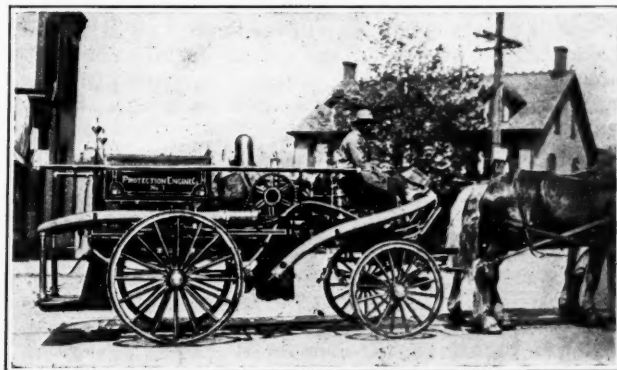
Commissioner Reports City Lighting Plant a Success

Springfield, O.—H. R. Davidson, Commissioner of Public Health and Safety of the city of Springfield, Ill., investigated the arrangements of the market at the city hall recently, with a view of getting suggestions for a similar public market in his home city. He expressed himself as much impressed with Springfield's plan, and said that he would investigate the public markets of a number of cities of the Middle West before action would be taken with regard to the general plan of the structure to be erected in the Illinois capital. Upon learning that many citizens of Springfield are interested in a proposal to establish a municipal lighting plant here, he said that the plan had been adopted in his city with great success, and was now running upon a profitable basis. The plant at Springfield, Ill., he said, cost \$300,000, and is under his supervision. He explained that the city had found it a profitable investment for lighting its streets, the arc light costing the city \$130 per year previous to the time of the installation of the new plant, but that the cost now had been reduced to \$60 the light per year. The current furnished private establishments and homes for lighting and power purposes, he said, brings in an income which is almost a clear profit.

FIRE AND POLICE

New Fire Apparatus of Fishkill Firemen

Fishkill, N. Y.—The new fire apparatus of the Protection Engine Co., shown in the picture, is the Howe make, the



Courtesy Newburg News.

FISHKILL'S GASOLINE PUMPING ENGINE.

pump being run by gasoline. A test demonstrated its efficiency and the Fishkill authorities are very much pleased with the machine.

To Form Auto Squad

San Francisco, Cal.—A squad of thirty motorcycle policemen, to be known as the automobile squad, will soon be formed by Chief of Police White, and a building to house the machines will be erected somewhere in the Richmond district. The squad will be under the command of Corporal Peshon. The members will ride along the drives of the park and the streets and avenues in the Richmond, Sunset and Western additions, and keep a lookout for chauffeurs who violate the speed law.

Little Use for Fire Department

Bordentown, N. J.—In his annual report to Common Council Fire Chief Charles E. Burr reported that during the year ending June 4 seven alarms of fire were given with a total loss of \$50, which was not covered by insurance. Chief Burr also reported that the various fire companies had 2,200 feet of fire hose in good condition, and warned Council of a number of crossed wires within the city limits which should be looked after so as to avoid serious consequences.

Laying Big Mains for Fire Protection

Bayonne, N. J.—Impressed with the gravity of the water supply conditions when it comes to fighting large fires in Bayonne, Mayor Cronin has taken steps to have the additional 30-inch water main placed in commission without any more undue delay. In this connection he said: "Early in July we hope to find the new 30-inch main across the meadows complete, as well as the present line repaired and put generally in good serviceable condition. This will give us a double supply equal to 30,000,000 gallons daily available at any time should the emergency arise. We further expect by the time the new main is in working order to have the new 16-inch main in the Constable Hook factory district completed. It is then our intention to tap the 16-inch line into the 30-inch main at Avenue E and Twenty-second street. When this is done we should have ample pressure for all needs for many years to come. We are now investigating the location of small lines laid many years ago, some of which I understand have dead ends. These will be removed and wherever necessary the lines will be enlarged. These improvements, together with the strengthening of the fire department, both as regards additional apparatus—which matters have been under consideration since May 1 and will be effected in the very near future—should provide sufficient fire protection."

Isolated Fireproof Building for Fire Alarm Headquarters

San Francisco, Cal.—William J. Nixon, Chief of the Department of Electricity, delivered an informal talk on the city's fire alarm system at a meeting of the Downtown Committee of the Chamber of Commerce, as it is, and as it should be, and made a strong appeal to the members of the committee to get behind the project of having an isolated fireproof building placed in the civic center to house the fire alarm equipment. He said that under the present administration the system was being brought up to date as rapidly as possible. "Within ninety days," he said, "all fire alarm boxes will have been reconstructed so as to be operated by breaking a pane of glass and turning a permanent key, saving the delay of going to the nearest store or house for a key. The placing of red globes on all street lights adjacent to fire alarm boxes was brought about by President Brandenstein, of the Fire Commissioners, who also started a movement to have the location of the nearest box noted on a card placed on the front door of all householders."

Police Signals on State House Dome

Springfield, Ill.—The big red lights purchased by the city and which will flash from the dome of the State Capitol as a signal to patrolmen in the residence districts of the city, will arrive within the next few days and the new signal service, which has been installed by Chief of Police Underwood, will be operated at once. All the wiring has been completed for some time and the globes are expected soon. The new signals on the dome of the capitol offer a solution to a problem which Chief Underwood has had under consideration since first taking office. When Henry Kramer was chief of police he attempted to have red light signals such as are now used in the business districts, also installed in the different wards of the city for the resident patrolmen. He was unsuccessful in getting them established. Immediately upon taking office Chief Underwood stated that some plan must be hit upon to signal ward patrolmen, just as the business district policemen are signalled. It was found impossible to install the lights in every ward, so the plan of having big lights shine from the dome of the capitol was suggested and adopted several weeks ago. Patrolmen on their beats are ordered to keep watch on the lights and in case the signal is flashed the men are to call the police station at once.

Tacoma's Motorcycle Police in Commission

Tacoma, Wash.—Tacoma's police department has a motorcycle squad. Under the leadership of Officer J. C. Cornish, who will be officially titled captain of the mounted police, four officers have begun regular duty running down automobile enthusiasts and speeders, and acting as emergency officers in conjunction with the regular police force. Three bright, new motorcycles of eight horsepower each have arrived in the city and have been placed in police service. The police department already has one machine. The police motorcycles will be dark blue in color, while that of Capt. Cornish will be red. The officers will adopt a mounted police uniform—an innovation in Tacoma—of dark green corduroy.

Physical Standards for Firemen Raised

Boston, Mass.—All appointees to the Boston fire department in the future must be at least 5 feet 7 inches tall and weigh not less than 140 pounds if the minimum height and weight ordinance adopted by the City Council is approved by Mayor Fitzgerald. The ordinance was adopted after a lengthy discussion during which President Attridge and Councilmen Ballantyne, Buckley and McDonald fought strenuously to allow Fire Commissioner Cole to exercise his own discretion in the height and weight requirements, or place the minimum height limit at 5 feet 6 inches and the minimum weight at 135, as suggested by the fire commissioner in a letter to the council. It was declared there are 200 men on the civil service commission's eligible list who are under 5 feet 7 inches in height and who have passed all the other requirements.

Investigating Fires for Profit

New York, N. Y.—What the New York fire department officials consider a regular traffic in fires by experienced "firebugs" is being brought out before Judge Fawcett and a jury in Part II of the County Court, Brooklyn, in the trial of Samuel Brandt for arson. An alleged confession of Brandt is being used to establish the theory of the fire marshal's office that fires are being constantly set for profit in and near Greater New York. The fire for which Brandt is under indictment happened at 726 Cleveland street, Brooklyn, on December 18 last.

High-Pressure System Checks Fire

Baltimore, Md.—Several weeks ago a three-alarm fire gave Baltimore's new high-pressure system a severe test. The picture shows the department working hard to check the fire in Pratt street. A number of firemen were injured and many had narrow escapes. The narrowest escape from serious injury was that of George Young, of No. 1 High Pressure Company, when No. 2 tower slipped and fell, after it had been taken out of commission and after the fire was practically over. The heavy tower came near falling upon him, and he only escaped by his agility in jumping from the tower wagon. A trolley wire, torn down by the tower, fell near him, but the current had already been cut off.



Courtesy Baltimore News.
FIGHTING DISASTROUS BLAZE ON PRATT STREET.

AUTO APPARATUS NOTES

Notable Decision in Pittsburgh Favoring Established Manufacturers as Against "Assemblers"—New Piston Pumping Engines Show Good Results in Tests at Washington and Bridgeport

Elizabeth, N. J.—Unless there is some unforeseen change in the present arrangements of the officials of the Elizabeth Fire Department, the next three weeks will see the city in possession of the first of the two new firehouses, the one on Prince street, in which will be housed Engine No. 7, better known as the automobile fire engine. Like the house in which they are to be installed, the quarters and equipment will be the last word in modern firehouse construction and will be a needed addition to the city's fire-fighting facilities. The house is a two-story structure of tapestry brick, cement floors throughout on the lower floor, and slow-burning or mill construction above the first story. There is a two-way entrance in the front for apparatus and one on the side, making the building available for additional motor apparatus if it is considered necessary later. The apparatus stationed in the house will respond to alarms on a new schedule prepared by Chief Gerstung, and will give much-needed protection to the sections of Elizabeth west of the railroad tracks, El Mora, and the North Broad street sections, which have heretofore been difficult to reach. The lower portion of the house is half tiled on the working floor, with automobile pits for repairs, washstands and all appurtenances. The second floor is devoted to quarters for the men, storerooms and offices, and in the rear there is a large hose tower. With the completion of the building, which is now in its last stages of construction, the new house and triple combination engine will go into commission. The new headquarters building at Port and High streets is also being pushed forward rapidly. This is also for automobile apparatus, and when completed will house the new electrically-driven automobile fire truck and such additional apparatus as may be purchased later. The new headquarters will contain quarters for the chief, board of commissioners and the fire alarm and police telegraph systems, which, it is expected, will be installed before July 1. This house, while larger than the Prince street fire station, is constructed on somewhat the same lines.

Lynn, Mass.—Accompanied by Mayor Connery, Commissioners Bayrd and McPhetres, Chief Harris, Captain Welch and Lieutenant Marsh, of the fire department, and a number of interested citizens, O. S. Doolittle, sales manager of the Webb Motor Fire Apparatus Co., gave a demonstration of a Webb auto chemical and hose wagon one day last week that was extremely satisfactory to all. Stopping at City Hall for the members of the council, Bay View avenue, from Western avenue, was the first test, and this steep hill was climbed easily with eight men and the full equipment. A run was then made to Newhall Heights, near the Myrtle street car barns, but here, on account of the steep grade, the tank refused to feed gasoline enough to supply the power. Beacon Hill avenue was then tried and here the same obstacle was met, so that a further demonstration will be made later after the tank has been raised to a sufficient height to supply the gasoline to the engine. In every other way the machine was satisfactory to those who witnessed the tests. The apparatus is a standard 1912 single 40-gallon chemical engine and hose wagon. It will carry 1,200 feet of 2½-inch hose and 200 feet of chemical hose. It is equipped with a 25-foot extension ladder and a 10-foot roof ladder, two hand chemicals, door opener, two axes, two pike poles and four lanterns, two headlights of great power. The engine is a four-cylinder, 88-horsepower, 5¼ x 6, the wheels are three-inch spokes, 14 to the wheel, with 6 x 40 tires. The engine is equipped with four speeds forward and a reverse.

Pittsburgh, Pa.—"Assemblers" of automobiles will have little chance in the future of selling automobiles to the city of Pittsburgh. This was proven on May 9 when the Knox Automobile Company and the American-La France Company got the contracts to furnish six motor fire apparatus, three each, at \$5,250 each. The lowest bidder to supply the machines had his bid in at \$4,500 each, but this bid was ignored and the contracts given to the other concerns. Mayor William A. Magee and Director H. B. Oursler, of

the Department of Supplies, appeared before the finance committee of the council in behalf of the successful bidders. They argued that as the lowest bidder was an "assembler" of machines and not a manufacturer, he was not the lowest "responsible" bidder, and therefore should not be given the contracts. The officials stated that these assemblers were in business to-day and may be gone to-morrow. In the latter case, when a piece of mechanism was needed for the apparatus it could not be had. With a manufacturer supplying the needs of the city any part could be had at any time, they argued. The councilmen saw the matter in this light and recommended that the manufacturers, rather than the assemblers, be given the work, which action was taken, it also having the approval of City Controller E. S. Morrow. The latter stated that the Mayor and director were acting within their legal rights in refusing to take the bids of the lowest bidder, as they had to decide regarding the "responsibility" of the bidder.

Butler, Pa.—The South Side fire truck, which has been in use since the paid fire department was established, has been dismantled, the ladders, chemical tank, etc., having been removed to be shipped to the Knox Automobile Company, to be placed on the new auto truck being manufactured for the city by that company. The horse truck from Central station has been transferred to the South Side and has been fitted with the three horse hitch and will be used on the South Side until it is replaced by the auto truck, which is expected to be completed and shipped to Butler by about the first of August.

Washington, D. C.—A new motor engine for the fire department has arrived from Cincinnati. The final tests of the engine were begun at the 16,000-gallon cistern at Louisiana avenue and Seventh street, Frank J. Wagner, chief of the fire department, and the superintendent of machinery being on hand. Later the endurance test of six hours was started near No. 24 engine company's house, at Petworth, where the new engine is to be put in service. It is the first engine of its particular type that has been built, and is required to displace at least 700 gallons of water a minute. At the displacement tests several different size nozzles were used and the displacements ran from 702 to 840 gallons, and the full force of the engine was not employed. It is said it is capable of displacing as much as 900 gallons a minute. It is equipped with a self-starter, so that there will be no reason for delay in getting started when an alarm is received. The machine carries a tank of about 80 gallons capacity and consumes about 10 gallons of gasoline an hour, so that fuel enough to last eight hours may be carried. A speed of 40 miles an hour, it is stated, may be attained. The apparatus is equipped with a double-acting piston pump similar to those used on other engines. Chief Wagner was highly gratified at the showing made by the new apparatus. It worked well, he said, and there was not a single hitch in the test. As soon as the hose wagon reaches here the new company will be installed, and Chief Wagner says it will mean much better fire protection in the territory north of the city.

Bridgeport, Conn.—In a test held before President Wallace G. Taylor, of the fire board, Chief Edward Mooney, Superintendent of Machinery Arthur Tracy and the representatives of the National Board of Underwriters, the new \$10,000 Waterous gasoline fire engine ran for one hour, throwing 725 gallons of water a minute, according to the nozzle tests. During the entire hour the capacity varied but a trifle and a glass of water placed on the body of the engine directly over the pumps was agitated but little, testifying to the smooth running of the new giant. A maximum capacity of 889 gallons of water per minute from a 2-inch nozzle was maintained for nearly a quarter of an hour, showing what the engine could do in case of necessity. The contract capacity of the engine is 700 gallons of water per minute and this was so far exceeded that there is no question that the new piece of apparatus will be accepted immediately by the fire commissioners. The test was started at 10.30 o'clock at the foot of Wall street. A careful measurement showed that the distance which the engine was forced to lift the water was 8 feet 9 inches. Two lines of hose were siamesed and different nozzles tried out during the two-hour test. The stream was a very powerful one and reached for a long distance.

GOVERNMENT AND FINANCE

Will Borrow Cash to Pay Interest on Bonds

Morristown, N. J.—At a short session of the Board of Aldermen, the finance committee recommended that \$7,300 be raised by note to meet the interest on the \$360,000 of sewer bonds outstanding; that a note for \$11,000 for seven months be discounted in anticipation of taxes for general purposes, and that sewer notes be renewed as necessary on July 1. All these recommendations were concurred in.

Commission Form for Frankston

Frankston, Tex.—This city adopted the commission form of government June 1 by a vote of 83 to 65. The incorporation begins with P. W. Burtis as Mayor and C. R. Emerson and D. C. Killian as commissioners.

Municipal League for Efficiency in City Work

Los Angeles, Cal.—The Municipal League has adopted resolutions endorsing the efficiency bureau for Los Angeles, as proposed by the Civil Service Bureau, and has placed before the city charter revision committee, or Board of Freeholders, a communication in which its stand is stated. The idea of the efficiency board appeals strongly to the league, and that it would result in a great saving of money and labor in the performance of the city's work is the sentiment expressed in the following communication, sent to the charter body: "Gentlemen—To the end that the new charter may provide for the greatest possible efficiency and economy in the administration of city affairs we respectfully urge that your honorable body give due consideration to the matter of providing for an efficiency bureau. Such a bureau, composed of experts working in co-operation with the departmental heads, could establish a standardized basis from which to apportion the funds of the city, thereby obviating many of the objectionable features at present encountered in making the annual appropriations and at the same time establish a system of individual efficiency records and unit costs as a basis for proper administration. It is a well-known fact that present methods permit of needless duplication and expensive practises that could and should be done away with by a thorough study of conditions and the employment of the principles of operation that are the essential features of all successful private enterprises, and are, for the most part, thoroughly applicable to public business. Yours very truly, The Municipal League of Los Angeles, by Harold Ryerson, Assistant Secretary. By order of the executive committee."

Durango People to Vote on Commission Form

Durango, Colo.—By the action of the charter delegates assembled in convention to frame a charter for the city under the commission form of government, one mayor and two commissioners will be provided for in the charter when submitted to the people. This action resulted after a bitter fight by the opposition, which favored a one man system of government and also insisted that the choice should be left to the people. The one man system provided for a board of five directors to serve without pay, it to appoint a supervisor or general manager, that the names of all city employees and the salaries each received be submitted to the board of directors for their rejection or approval. It also provides that four members of the board should be elected from four districts in the city and the fifth member to be elected at large, but that all five of them should be voted for at large and according to the statutes of the State, as in general elections, and each director to be elected for the term of two years.

New Commission Created

Boston, Mass.—A bill establishing a commission of labor and industries, with a provision for a commissioner of labor, has been signed by Governor Foss. The commission will be composed of three persons, one of whom must be a woman.

Sumter Voters Declare for Commission Form

Sumter, S. C.—Sumter has voted in the commission form of government. The vote on the commission form was 252 for to 72 against. On the question of manager or no manager it was 201 for a city manager and 121 against the manager system. Under the plan adopted there will be elected a mayor at a salary of \$300 and two aldermen at \$200 each. These will elect the manager at such salary and under such conditions as they see fit.

STREET CLEANING AND REFUSE DISPOSAL

City Oils Forty Miles of Streets

Providence, R. I.—"The first oiling of the streets for this season has been completed," said Commissioner of Public Works Walter F. Slade, "the city having completed the 40 miles of oiling called for by the appropriation. Next week, the second round will be made, the 40 miles being gone over for the second time." Broad street and Elmwood avenue are not being oiled at present this season, water being used to lay the dust. This is because of the experiment which is to be tried out on those two thoroughfares this year by the commissioner in the effort to overcome the muddy conditions that exist on those streets. The experiment is to be carried out with a hot tar dressing, this process being found successful in other cities in holding the dust down and also in preventing moisture from penetrating the surface with consequent mud. At the present time the department is at work on the two streets, filling in the low places with a mixture of hot tar and fine broken stone to make an even and uniform surface. As soon as the filling is completed the watering of the streets will be abandoned and the new surface will be treated to the application of tar. The experimental strips of road which are to be constructed on North Main street, between Grand View street and the Pawtucket line, will be started in a few days. It is the intention of the Commissioner of Public Works to lay different kinds of roadway over the long stretch selected, upon which a comparative test can be made, and the different qualities of the several varieties of roads under the heavy traffic conditions watched. The report upon this experiment is being awaited with interest by the city engineers of other cities throughout the country, and it is expected that many will visit the city when the roads are laid for the purpose of inspecting the different methods. "The reason the city has stopped watering the streets is because of the great injury to the paving that accompanies the laying of dust by water," said Commissioner Slade. "The water keeps the wearing surface of the roadway softened, and under the enormous modern traffic, where we have automobiles running over the road at the speed of 20 miles an hour and upward, with chains on the tires, destruction of the roadway is certain within a month or so. The oil has been a very great improvement over the water. It has, in a measure, preserved the roadway. Of course, oil is objectionable in some respects, as after a rain. But generally the oil is far ahead of water and it keeps the dust down day and night for every day in the week, which was not the case with water. The city, however, is not wholly satisfied with the use of oil, but will continue to experiment in other ways to ascertain the cheapest roadway that can be built and maintained to accommodate modern traffic conditions. That is the problem before us, and which we are trying to solve." The commissioner said that the city paid for oiling the streets on which the street car tracks are laid, and that under the new contract with the Rhode Island Company, the company paid as much toward the oiling of those streets as it would if water was used, the railroad's territory being between the car tracks and a distance of 18 inches on either side of the tracks.

Wilkes-Barre Will Stop Street Sweeping

Wilkes-Barre, Pa.—Street Commissioner Boyle is much elated over the scheme of flushing the city streets instead of sweeping them. The city has been experimenting with this method for a week or ten days; it has been done at night and gives entire satisfaction, the residents along the thoroughfares that have been treated in this manner being much elated over the new method. In all probability when the contract is let next year for the cleaning of the streets they will be washed instead of swept, as is the practice now. The street commissioner in referring to the cleaning the streets in this manner had the following to say in regard to it before the street cleaning committee of councils at the meeting recently: "From a sanitary point of view it surpasses any other method of cleaning that I know of. There is very little odor during progress of the work and absolutely none after it is finished. The contrast between a flushed street and a swept street is greatly in favor of the former. In sweeping a street, whether by machine or

hand, a certain amount of dust naturally arises and again when the sweepings are being loaded into carts a second quantity of dust is scattered and a third quantity is left on the streets along the gutters to be blown into houses and stores by the first wind that arises or is converted into mud by the rain, whereas in the case of flushing the whole of the accumulations, whether of paper, horse droppings or any kind of rubbish is washed from the streets into the sewer, leaving the streets clean, pleasant to look at, sweet and wholesome to the sense of smell. I cannot too highly recommend the flushing system, although I must confess that the system I was compelled to work under consumed too much time and is too expensive. With proper apparatus consisting of hose with two branches or Y, and an appliance to which can be attached a horse for drawing the same, also a number of small trucks mounted on wheels to carry the hose, at least three times the amount of work can be done with less men and a great reduction in expense. I have had all the catch-pits examined and find them fairly free from mud, etc., showing that the rush of water prevented any great amount of sediment settling in the bottom of the pits."

RAPID TRANSIT

Grant Trolley Franchise

Freeport, L. I.—The Board of Trustees has formally granted a franchise to the Freeport Railroad Company to operate a trolley line through Grove street, from Olive Boulevard to Front street, and thence westerly to Swift Creek. Many of the conditions of the original franchise were waived in lieu of a cash payment of \$10,000, which will be used to improve the street through which the line will pass. The acceptance of the terms of the agreement as modified was a surprise to many. Roland M. Lamb, president of the railroad, however, said he could not consider an annual rental figured on a rising scale and make the cash payment also. The money will be used to lay a storm sewer along the east side of Grove street, between Merrick road and Archer street, and the grading of the street over the entire route of the trolley.

MISCELLANEOUS

Civic Association Places Street Signs

Sewaren, N. J.—The Sewaren Civic Association has just placed street signs at thirteen of the most prominent corners in town. The signs are made of the best blue and white guaranteed enamel. Through the courtesy of Mr. Whitaker three of the signs were placed upon his store. William R. Keifer, although not a member of the association, kindly volunteered his services in mounting and locating the signs. Earnest effort has been made by the civic to improve the town and co-operation of residents is greatly appreciated.

City Fresh Air Farm Selected

Schenectady, N. Y.—The city has secured the consent of the owners of the Putnam farm in Rotterdam for its use as a "municipal fresh air farm." Commissioner of Public Works Charles A. Mullen, accompanied by Commissioner of Charities Walter E. Kruesi and his wife; Miss Jeanette E. Cooley, stenographer to Mr. Mullen, and Augustus A. Van Wie and wife, visited the farm a few days ago in the municipal automobile. The site is said to be an ideal one. The farm is one of the oldest in this section. It is under cultivation, and has large meadow lands, with woods, and other interesting features, as large barns with many head of cattle, horses, chickens, even cats and dogs. The city automobile will be used to convey parties of children to and from the Putnam farm, where they will be given the freedom of the place, under supervision. Four trips will be made in the morning, the first starting at 9.45 o'clock, and on each of these as many children will be carried as the car will comfortably hold. A matron will go with each party. The children will carry lunches, but milk and other refreshments will be provided by the city in the country.

For a City Beautiful

Jackson, Ga.—The business men of Jackson want the court house lawn cleaned up and made more attractive, and

with that end in view are presenting a petition largely signed to County Commissioner J. O. Gaston. He is asked to put the convicts to work on the court yard for a short time and get the grounds in good condition. Butts County has one of the best court houses of any county in the State, but the court lawn has long needed attention.

Woman Mayor's Foes Safe

Hunnewell, Kan.—The Kansas Supreme Court has refused to oust the Councilmen of Hunnewell, who differed with the woman Mayor, Mrs. Ella Wilson, as to how the business of the town should be administered. The court retained jurisdiction over the case so the Councilmen might be removed from office later should their attitude at any time, in the opinion of the court, justify such action.

Municipal Store to Lower Prices

Spokane, Wash.—C. D. Coates, Commissioner of Public Works, has announced that he would ask the city commission to appropriate from \$100,000 to \$200,000 to establish a municipal store for the purpose of furnishing food and clothing to the people at cost prices, in an attempt to lower the cost of living. Commissioner Coates, while elected on a non-partisan ticket, has been prominent in the affairs of the Socialist party in this State.

Elaborate Plans for Syracuse Barge Canal Terminal

Syracuse, N. Y.—Practically the entire southern end of Onondaga Lake will be utilized in providing barge canal terminal facilities for Syracuse. There will be a turning basin about three-quarters of a mile from the lake shore, in a bend of Onondaga creek where the new channel commences, bringing it within a few hundred yards of Spencer street. There will be another harbor or turning basin in the immediate vicinity of Free street. From a point west of the Spencer street harbor to a point east of the Free street cut land will be reclaimed from the lake. This probably will be protected by a sea wall. This land may be utilized for park and boulevard purposes if the city wants to pursue that plan. The Solvay Process Company, which now holds by grant from the State much of the land included in the plan, has signified to the State Engineer its willingness to deed back as much of the property as is needed for the development.

Official Flag for Spokane

Spokane, Wash.—On request of Mayor Hindley, the Spokane Ad Club has decided to take steps toward the adoption of an official municipal flag for the city of Spokane. President R. E. Bigelow has appointed a committee consisting of H. G. Duerfeldt, E. E. Faville, Robert S. Phillips and Robert H. Cosgrove to determine the manner of adoption of the emblem. The mayor received a request recently for a photograph of the municipal flag of Spokane for publication together with similar emblems representative of other cities of the United States. The mayor forwarded the request to the Ad Club, with the wish expressed that the photograph desired be forwarded. After President Bigelow had made an investigation it was learned that during all these years Spokane had been going along peacefully without any municipal flag. It was at once determined that one would be secured immediately.

Street Speaking Checked in North Bend

North Bend, Ore.—The city has taken steps to prevent the holding of I. W. W. meetings and speechmaking on the streets. The Council has passed an ordinance providing that any persons desiring to make speeches on the streets must obtain from the Mayor a permit in writing, stating exactly when the speech is to be made and stating the text of the address. It is stated that the Councilmen passed the ordinance in order to control and prevent any I. W. W. troubles on the public streets of North Bend.

Trolley Cars to Move Under Power

Boston, Mass.—An innovation in passenger transportation which will again place Boston in the lead of the world as regards trolley cars will be inaugurated in Boston within a short time, according to Patrick F. Sullivan, president of the Bay State Street Railway Company. Mr. Sullivan had in mind a new type of storage battery which will transform each trolley into an individual vehicle, independent of power-houses and trolley wires. It is said that this innovation is to be adopted in Boston some time in the future, but no definite time has been set.

LEGAL NEWS

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

Public Improvements—Notices—Sufficiency

Miller et al. v. City of Portland et al.—City charter of Portland requires the city engineer to post at each end of the line of the contemplated improvement notices of prospective improvements of public streets, so that, where a street, which was to be improved, twice intersected a second street, an affidavit, reciting that notices had been posted at the intersection of the street to be improved with the second street, was insufficient for uncertainty.—Supreme Court of Oregon, 123 P. R., 64.

Improvements—Contracts—Performance

City of Beaumont v. Masterson.—Where, in a suit by a third person contracting with a city to complete public work on the abandonment of the work by the original contractor, the court struck out the intervention of a materialman furnishing materials to the original contractor for construction of the work, and the materialman did not appeal, the city, appealing from a judgment against it in favor of the third person, could not complain of the ruling on the intervention, in the absence of facts showing any liability on the part of the city to pay the materialman's claim, which was barred by limitations.—Court of Civil Appeals of Texas, 145 S. W. R., 1079.

Officer in Charge of Work—Statutes

Gratz v. City of Kirkwood et al.—Where the mayor of a city constructing a sewer took charge of the construction work and called to his assistance a competent engineer, who did work under the personal supervision of the mayor, who was constantly in direct supervision of it, and the engineer submitted a report as to the completion and cost of the work to the mayor, who in turn verified the computation and submitted it to the municipal authorities as his own computation, and they accepted and approved of it and ordered the issuance of tax bills, there was a substantial compliance with Revised Statute 1909, requiring an engineer or other officer to have charge of the work, who shall compute the whole cost thereof; the mayor being an officer in charge of the work.—St. Louis Court of Appeals, Missouri.

Proceedings to Assess Compensation

In re 225th street (Muscoota street) in City of New York.—Under Greater New York charter, which provides that the Commissioner of Assessment shall in assessing the benefits of an improvement assess all lands, etc., within the area of assessment fixed by the Board of Estimate and Apportionment, where, in proceedings to widen a street, the Board of Estimate and Apportionment had fixed the cost and the area of assessment, together with the amount of the cost which should be borne by the city, the commissioner could only distribute the sum fixed to be paid by the area benefited in proportion to the benefit received, and could neither reduce the amount to be assessed nor increase the area of assessment.—New York Supreme Court, 134 N. Y. S., 926.

Street Assessments—Property Benefited

New York, N. H. & H. R. Co. v. Village of Port Chester.—Benefit to a railroad company from improvement of a street underneath its right of way from an increase in its business following the increase in business and population resulting to the village from improvement of its streets is too remote for consideration.—New York Supreme Court, 134 N. Y. S., 885.

Sewer Construction—Accident to Employee—Liability of City

Salmon v. Kansas City.—A municipal sewer construction contract, reserving to the city powers of supervision and control as to the quality of material and the mode of construction, to secure satisfactory performance of the contract, did not make the city liable to the contractor's employee for injury caused by his foreman negligently directing him to drill new holes in rock near unexploded blasts.—Supreme Court of Missouri, 145 S. W. R., 16.

Special Assessments—Instalments

Cooney v. City of Atlanta et al.—Though a contract by a city for street improvements provided that abutting property owners should have the option of paying assessments in cash or in instalments, with interest, an abutting owner must pay his assessment in cash, unless the city assigns the bill to the contractor.—Supreme Court of Georgia, 74 S. E. R., 837.

Ordinances—Violation—Evidence—Sufficiency

Town of Greenwood v. Smothers et al.—Under Kirby's Dig., which makes it a misdemeanor for one to refuse "without reasonable excuse" to aid an officer in making an arrest, and under an ordinance making it a misdemeanor for one to refuse to assist the town marshal in making an arrest, there is no violation of the ordinance in refusing to assist a marshal if the requested person is practically unable to do so on account of sickness.—Supreme Court of Arkansas, 146 S. W. R., 109.

Shade Trees—Destruction by City

Mayor and Council of City of Easton v. Turner et al.—A municipality should not unnecessarily or recklessly injure shade trees in the street belonging to abutting owners and should give the owners the opportunity to remove them, or, if possible without interfering with the proper use of the highway, should protect them.—Court of Appeals of Maryland, 83 A. R., 42.

Road Taxes—Apportionment by Legislature

Sanderson, County Collector, v. City of Texarkana.—The State being the owner of taxes collected, the fact that a road district, which contained a city, had incurred debts which it had expected to pay out of a certain road tax, will not make it an impairment of the obligation of a contract for the Legislature after collection of the tax, to direct that part of it should be paid to the city for use on its own streets, especially where the road district had funds remaining sufficient to pay its debts.—Supreme Court of Arkansas, 146 S. W. R., 105.

Local Self Government—Restraints on Legislature

In re Opinion of the Justices.—As the Constitution, which is a confinement and restraint of the power of the Legislature, rather than a grant, places no restraint on its control over municipal corporations, a resolution of the Legislature, providing for the submission to the vote of the question whether the General Assembly shall be authorized to issue State bonds for the acquirement and improvement of real estate for public reservations and parks in the metropolitan park district of Providence Plantations, created by Gen. Laws 1909, which provides for the repayment of the amount expended to the State by the cities and municipalities included in the district, is not invalid as an interference with local self-government.—Supreme Court of Rhode Island, 83 A. R., 3.

Failure to Open Bridge—Liability

Munroe et al. v. City of Chicago.—The steamer Markham, going up Chicago river at night, when 800 feet away, signaled for the opening of the bascule bridge at Taylor street, owned by the city. The bridge was not opened, and the steamer proceeded for 400 or 500 feet at slow speed, signaling twice more, and then stopped and backed; but her momentum and the current carried her against the bridge and she was injured. The bridge was equipped, as required by the Government regulations, with two red lights in the center, one on the end of each opening section, which changed to green lights when the sections and lights were raised. The weather was clear, and such lights could be seen by the steamer. An ordinance also required a signal light to be shown where for any reason the bridge could not be opened; but it was not observed. Held that, under the settled rules in admiralty, that it is incumbent on the owner of a bridge over a navigable stream to keep some one in charge to operate the same on proper signal, that the right of navigation is paramount, and that a vessel, having signaled, may properly proceed at slow speed, on the assumption that the bridge will open, until it appears by proper warning or in reasonable view of the situation that it will not, the steamer was not in fault, and that the city was liable for her injury.—United States Circuit Court of Appeals, 194 F. R., 935.

NEWS OF THE SOCIETIES

American Society of Civil Engineers

The forty-fourth annual convention will be held in Seattle, Wash., June 25-28. Secretary Chas. Warren Hunt has issued the following announcement of the program:

Monday, June 24, evening.—Informal reception at Hotel Washington, with lecture and stereopticon views of Mt. Rainier.

Tuesday, June 25, 10 a. m.—Meeting to be called to order by the president. Address of welcome by the Governor of Washington and the Mayor of Seattle. Annual address delivered by the president.

Afternoon.—Excursion by steamer to the Bremerton Navy Yard, passing the creosote plant at Eagle Harbor and the Port Blakely sawmills, landing on return to Seattle at Moran's ship building yards.

Evening.—Paper on "Pacific Coast Engineering," by R. H. Thomson, M. Am. Soc. C. E., former city engineer of Seattle and of the Port of Seattle. Paper by some California member of the society on a subject to be designated later.

Wednesday, June 26, 10 a. m.—Business meeting.

Afternoon.—Excursion by steamer to Tacoma. Luncheon at Commercial Club and an automobile trip around the city.

Evening.—Papers on the "Harbors of the Pacific Coast," speakers to be announced later.

Thursday, June 27, 10 a. m.—Papers on "Irrigation," by speakers to be announced later.

Afternoon.—Members will have their choice of the following entertainments and excursions, viz.: Luncheon at Golf and Country Club. Trip by automobile to Snoqualmie Falls power plant. Automobile trip to Merrill & Ring's logging camp, near Everett, Wash. Inspection of the park system of Seattle by automobile.

Evening.—Reception and dance.

Friday, June 28.—The entire day will be devoted to excursions to various points of interest, and the trips have been so planned as to suit the convenience of members and guests returning to their homes by different routes, arrangements having been made for the following trips, viz.:

An excursion by steamer to Hood's Canal, for those who are leaving on Saturday and wish to make a short trip on Puget Sound.

Trip to Victoria, B. C., for those who are returning to the East via the Canadian Pacific Railway, and for those who not only wish to visit Victoria, but who desire a longer trip on Puget Sound than is provided by the excursion to Hood's Canal.

Excursion by train and automobile to Mt. Rainier. Those who take this trip will stay at the National Park Inn on Friday night, returning on Saturday, unless they desire to spend more time in that vicinity, in which case arrangements will be made for their return at such times as they may elect. Side trips may also be taken by those who go to Mt. Rainier.

Municipal League of Indiana

The program for the annual session of the league, Hartford City, July 9-11, has been announced by President

Lemuel Damon, Laporte, and James T. Traut, Hartford City, as follows:

The program for Tuesday, July 9, includes the reception of delegates and the address of welcome by A. G. Emshwiler and response by J. Fred France. An address, "The Building of a City," by Mayor Thomas E. Knotts, of Gary, will be followed by discussion, led by Thomas B. McGregory of Madison. "How Should School Trustees Be Elected and What Power Should They Have?" will be presented by James Schooler of Lafayette, followed by discussion led by Hamlet Allen, Washington. "The Lighting of a City" will be the subject of an address by Mayor John Herzog of Mishawaka. The discussion will be led by N. M. Argobrite of Hartford City. William A. Yearly, chairman of the industrial education committee of Shelbyville, will have for his subject "Industrial Education"; discussion led by Dr. E. A. Rumley of Laporte. At Wednesday's session "What Is the Best Form of Municipal Government" will be the subject of Thomas Thieme, president of the Fort Wayne Commercial Club; discussion led by Judge Lawrence Becker of Hammond. "Should the Proposed Amendment to the Street Improvement Law, as Reported by the Committee, Be Adopted?" will be the question submitted by Timothy E. Howard of South Bend, former judge of the Supreme Court, and the discussion will be participated in by Henry Klausmann of Indianapolis, Finley P. Mount of Crawfordsville, Roy Shattuck of Brazil, and James Fortune of Jeffersonville.

"The Milk Supply of a City" will be the subject of Dr. W. G. Swank of Crawfordsville, and John F. Willets of Indianapolis will lead the discussion. Don Roberts of Terre Haute will present "How Should Cities Care for Their Streets and Pavements?" Discussion led by Dr. J. L. Puckett of Kokomo. Wednesday "Track Elevation for All Cities and Towns" will be handled by Henry G. Hogan, Fort Wayne, with discussion led by Robert E. Proctor of Elkhart. "District Workhouse for Municipalities," by W. H. Eichhorn of Bluffton; discussion led by President Darrow. "What Is the Most Economical and Lasting Paving for Residence Districts?" is the subject for A. M. Gardner of Richmond; discussion, Roy Johnston, Logansport.

Mayor Shank of Indianapolis is on the program to explain "Why All Cities Should Have Public Markets"; discussion led by A. B. Cooper of Columbus. "Should Cities Have an Official Sealer of Weights and Measures?" will be presented by Mayor Thomas L. Carmichael of Aurora; discussion, W. R. Vosloh, Mt. Vernon.

Thursday—"How to Beautify a City," Dr. E. C. Locher, Noblesville; discussion, W. B. Hess, Plymouth. "Would It Tend to Elevate the Standards of Municipal Offices to Eliminate Politics?" O. E. Brumbaugh, Frankfort; discussion, Mayor E. O. Rogers, Lebanon.

State Senator B. B. Shively of Marion will talk on "What, If Any, Changes Should Be Made in the Present City and Towns Law?" Discussion led by Julius Travis, Laporte.

The session will close with the election of officers and the selection of the next place of meeting.

PERSONALS

ALDRICH, DR. H. L., Caney, Kan., has been elected president of the Kansas State Board of Health.

BRYNE, JOSEPH M., and Richard Stockton, Newark, N. J., have been appointed members of the City Plan Commission.

COYLE, THOMAS, Paterson, N. J., has been made Chief of the Fire Department.

FARRAND, THEODORE S., Verona, N. J., has been re-elected Chief of the Fire Department.

KILROY, FRANK, DR., Detroit, Mich., has been elected City Physician.

KING, EDW. E., East Hartford, Conn., has resigned as president of the Board of Fire Commissioners.

NORRIS, DR. JOHN L., Washington, D. C., appointed Sanitary and Food Inspector in the Health Department, has been appointed Deputy Health Officer to succeed Dr. H. F. Sawtelle, resigned.

POLLARD, S. B., Cincinnati, O., Superintendent of Pumping Station, has severed his connection with the water department.

SNYDER, W. SCOTT, Tacoma, Wash., has been appointed Building Inspector.

STANTON, H. L., Chief of the Norwich (Conn.) Fire Department, has been made president of the Fire Chiefs' Association of Connecticut.

SUCRO, WM. C., Baltimore, Md., has been appointed Road Engineer for Baltimore County.

Calendar of Meetings

June 25-27.

South Carolina State Firemen's Association.—Eighth Annual Convention and Tournament, Rock Hill, S. C.

June 25-28.

American Institute of Electrical Engineers.—Annual Convention, Boston, Mass.—F. L. Hutchison, 33 West 39th St., New York.

June 26-28.

Society for the Promotion of Engineering Education.—Annual Meeting, Boston, Mass.—H. H. Norris, Secretary, Cornell University, Ithaca, N. Y.

July 8-12.

National Municipal League.—Annual Meeting, Los Angeles, Cal.—Clinton Rogers Woodruff, Secretary, 705 North American Building, Philadelphia, Pa.

July 10-12.

Fire Marshals' Association of North America.—Annual Convention, Detroit, Mich. Fire Marshal Palmer, Secretary, Lansing, Mich.

July 9-13.

International Association of Chiefs of Police.—Annual Convention, Toronto, Ont.—Major Richard Sylvester, Superintendent of Police, Washington, D. C., President.

August 28-30.

Virginia State Firemen's Association.—Twenty-sixth Annual Convention and Tournament, Roanoke, Va.—L. E. Lookabill, Vice-President, Roanoke.

August 26-30.

International Association of Municipal Electricians.—Seventeenth Annual Convention, Peoria, Ill.—Clarence R. George, Secretary, Houston, Tex.

September 17-20.

International Association of Fire Engineers.—Annual Convention, Denver, Col.—James McFall, Secretary, Roanoke, Va.

September 18-19.

New England Water Works Association.—Thirty-first Annual Convention, Washington, D. C.—Willard Kent, Secretary.—Headquarters, Boston, Mass.

September 24-26.

Central States Water Works Association.—Sixteenth Annual Convention, Detroit, Mich.—R. P. Bricker, Secretary, Shelby, O.

November 12-15.

American Society of Municipal Improvements.—Annual Convention, Dallas, Tex.—A. Prescott Folwell, Secretary, 50 Union Square, New York.

MUNICIPAL APPLIANCES

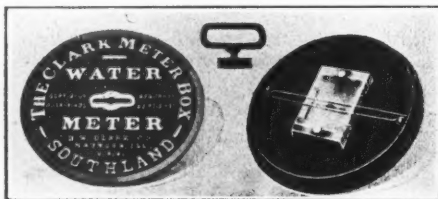
Exhibits at Louisville Convention of American Water Works Association

The thirty-second annual convention of the American Water Works Association was held at Louisville, Ky., during the week beginning June 2. Members of the American Water Works Association exhibited their appliances in the hall and rooms of the Seelbach Hotel. The names of the exhibitors and a brief account of their goods follow:

Proudfit Loose Leaf Co., Grand Rapids, Mich., samples of loose leaf account books, catalogue, binders, etc.

Addressograph Co., 901-911 W. Van Buren street, Chicago, Ill., samples of addressing machines, addressing in duplicate or triplicate for bills and notices of water works departments or companies. Facsimiles of bills actually addressed by these machines in a number of cities.

Builders Iron Foundry, Providence, R. I., Venturi Meters, showing small meter, meter indicator recorder giving thousands of pounds per hour and continuous rate record. The Venturi meter tube is usually made of cast iron, with a bronze lined throat. Tubes ranging from 1/2 inch to 210 inches in



AUTOMATIC LOCKING DEVICE.

diameter have been furnished by this company. The very large sizes are often made with cones of steel plate, wood or concrete. There is no mechanism in the meter tube, and it is placed in the same manner as an equal length of pipe. The recording instrument may be placed at any convenient point, usually within 200 feet of the meter tube. The pressures at the inlet and throat of the meter tube are transmitted to the mechanism by means of two small pressure pipes. The large 210-inch meter referred to was built for the Catskill aqueduct; the throat measured 93 inches. They showed apparatus for use in connection with filtration plants—effluent controllers, gauges for indicating and recording water levels, rate of flow and loss of head.

Schaeffer & Budenberg Mfg. Co., 431 South Dearborn street, Chicago, Ill., power plant instruments for pressure, temperature, speed and furnace efficiency. Vulcan soot cleaner, thermometers, pyrometers, recording thermometers, tachometer and the Hays gas analysis instruments, including the automatic gas collector, the analysis instrument and CO₂ and draft recorder.

H. W. Clark Co., Mattoon, Ill., meter boxes of five sizes, with new automatic locking device, wireless pipe locator, copper supplies, etc. The Southland is the name of a new meter box designed for export trade to southern countries, where the pipes are sometimes set within a foot of the surface of the ground. The box body is of galvanized sheet

iron, so light in weight that a man can carry it from the shop to the job under his arm. The new lid for meter boxes made by the Clark company is shown in the illustration. The key of the locking device forms a handle for lifting the cover from the box body. The key remains in the cover until it is replaced on the box body, when, with the withdrawal from the cover of the key, the locking bars automatically engage themselves under the flange of the box body, securely locking the cover in such a manner that it cannot be removed without the key provided for the purpose. The key cannot be removed from the lid without causing the box to lock. Directly beneath the opening in the cover is placed a dust pan for the purpose of catching any foreign matter that may be forced through the key opening, thus preventing an accumulation of dirt on the lid or dial of meter.

Badger Meter Manufacturing Co., Milwaukee, Wis., numerous sizes and types of disk water meters. The frost-proof meter has a special bottom, consisting of a plate of soft gray cast iron, thoroughly galvanized, and rustproof with a low breaking strength of 600 pounds. In case of freezing the ice breaks the bottom, releasing the pressure on the mechanism. Extension registers are a feature of these meters. These are furnished of any length, but three feet is considered a reasonable limit, for fear the weight of the extension rod might decrease the sensitivity of the working parts of the meter.

R. D. Wood & Co., Philadelphia, Pa., manufacturers of pipe, hydrants, valves, pumps, etc., photographs of construction work and appliances.

Allis-Chalmers Co., Milwaukee, Wis., photographs.

Hays Meter Mfg. Co., Erie, Pa., stop boxes, corporation cocks, unions, curb cocks, lead flange couplings.

Engineering Record, New York, N. Y., magazines.

Engineering News, New York, N. Y., sign.

Municipal Journal, New York, N. Y., sign.



CALKING MACHINE IN OPERATION.

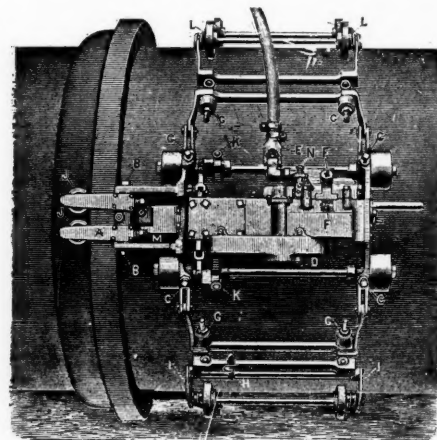
Snell & Stone, Attleboro, Mass., easy-on pipe couplings and tees.

Union Water Meter Company, Worcester, Mass., three types of water meters in a number of sizes, rotary, disc and velocity. The disc meter is called the King, the rotary is the Union rotary piston meter, and the velocity meter is the Columbia. The Nilo is also a velocity meter.

Hersey Mfg. Co., Boston, Mass., samples of model F, 5/8 to 1 inch, and 5/8 rotary meter; also Detector meters.

L. M. Booth & Co., 136 Liberty street, New York, N. Y., photographs of plants at McKeesport, Pa.; Georgetown and Owensboro, Ky.; Ft. McKinley, Me., where the company installed their appliances.

The Buffalo Meter Co., Buffalo, N. Y., American and New Niagara meters, of the disk type, samples in sizes from 5/8 to 2 inch. Accessibility is one of



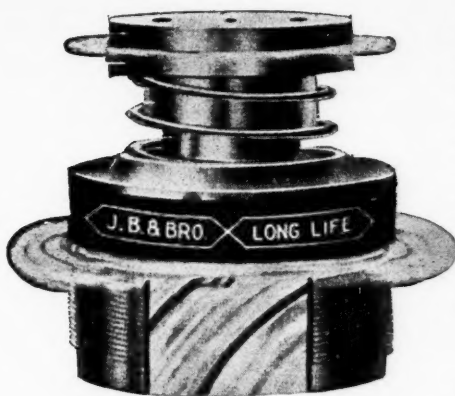
O'NEIL CALKING MACHINE.

the merits of this meter; it can be opened at the bolted flange for cleaning or inspection without disconnecting it from the pipe. A spud setting for this meter on a vertical pipe was also shown. Ease and economy of installation is the object of this device. It consists of two separate parts with sockets in which the meter is inserted and held by pressure applied through the center rod and nut.

S. E. T. Valve & Hydrant Co., Inc., New York, N. Y., perfect curb boxes, which completely enclose the valve, preventing the admission of dirt or other foreign matter.

A. P. Smith Mfg. Co., East Orange, N. J., corporation cocks, curb cocks, meter tester, bolted sleeve valve, fire hydrant, tapping machines, clamped sleeves valves. One of this company's most interesting devices, illustrated herewith, is the O'Neil patent calking machine, which was shown by photographs and literature. The method of operation is evident from an examination of the cuts. It is stated that the results are far superior to the best hand calking and that on mains of 24 inches and upward in diameter forty joints a day can be done.

James Boyd & Bro., Philadelphia, Pa., the turbine valve seat, which rotates owing to its peculiar shape, shown in the illustration, and results in increased life of the valve and increased efficiency of the pump. The shape of the openings through the valve seat gives a taper to the streams of water



TURBINE SEAT FOR PUMP VALVES.

and tend to retain the water under the valve with but little tendency to escape at the sides. When the water can lift the valve no higher it escapes from under, very much as it does from a hose nozzle when playing a stream against a brick wall, with the nozzle held very close to the wall. Again the position of the seat changes at every stroke of the pump. The course of the streams of water as seen in the illustration was shown in an interesting way at the exhibition by a model placed in a glass cylinder.

Henry R. Worthington, New York, N. Y., disk meters varying in size from $\frac{3}{8}$ to 2 inches, a 6-inch turbine meter and 6-inch Arrow meter.

H. Mueller Mfg. Co., Decatur, Ill., samples of sprinkling and flushing hydrant, curb box, repair lid, for the lame box, pressure regulator, curb cocks, corporation cocks, tapping machine, lead furnace and pipe-handling tripod.

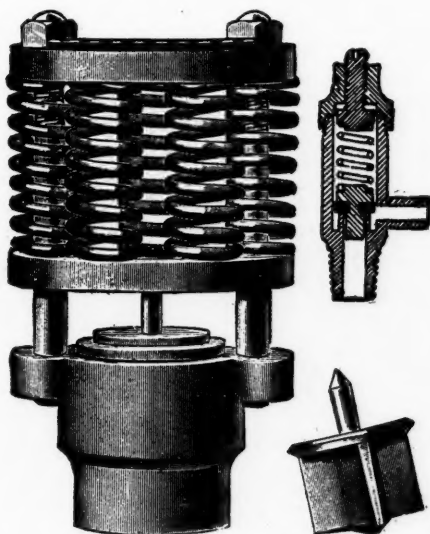
Thompson Meter Co., Brooklyn, N. Y., Lambert meters, varying in size from $\frac{3}{8}$ to 2 inches.

American Asphaltum & Rubber Co., Chicago, Ill., samples of asphalt pipe coating and literature describing it.

East Jersey Pipe Co., New York, N. Y., samples of steel lock-bar pipe, 20 inches and 34 inches in diameter.

Fire and Water Engineering, New York, sign.

National Water Main Cleaning Co., New York, photographs of streams of water from hydrants and hose drawn



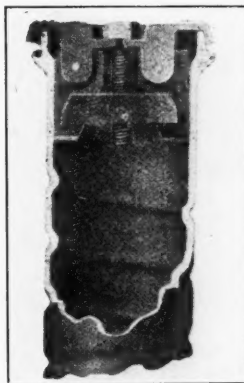
ROSS WATER RELIEF VALVE.

from water mains before and after cleaning, showing the efficiency of the process; sample of 6-inch turbine pipe cleaner; sample sections of badly tuberculated mains.

Glauber Brass Mfg. Co., Cleveland, O., brass cocks, goosenecks, etc.

Neptune Meter Co., New York, N. Y., samples of Trident, Trident crest and Trident compound meters, from $\frac{3}{8}$ to 6 inches in size; split case Trident meters; a 2-inch water cart meter; a portable test meter designed by A. E. Walden for the Baltimore County Water & Electric Company.

Ross Valve Mfg. Co., Troy, N. Y., regulating valves, two of which are herewith illustrated. The large valves for street mains are used to regulate pressure on gravity system, to regulate flow between reservoirs located at different levels, and to maintain or relieve pressure on pumps or pipe lines. One of these valves at Little Falls, N. Y., controls a gravity system with a head of 525 feet. The water relief valve is designed to relieve hammer or ram on water mains. They can be placed in the mains or branches at any convenient place, set at the maximum pressure,



MUELLER REPAIR LID.

and they will relieve the pipes and joints of the strain when hydrants and valves are opened and closed suddenly.

The Pitometer Co., New York, N. Y., a prism photo-pitometer and street connection. Literature describing the methods and results of pitometer surveys.

Pittsburgh Meter Co., East Pittsburgh, Pa., samples of Keystone and Eureka meters, from $\frac{3}{8}$ to 2 inches in diameter.

Jenkins Bros., New York, N. Y., valves, packing, pump valves and gasket tubing.

National Meter Co., New York, N. Y., samples of water meters.

Lead Lined Iron Pipe Co., Wakefield, Mass., samples of lead and tin lined iron pipe and fittings.

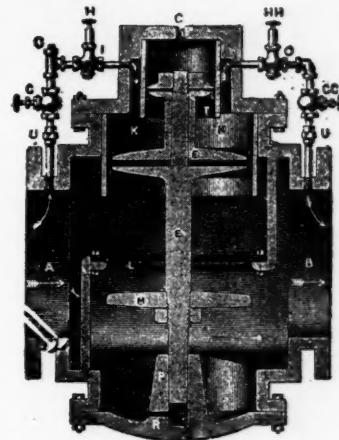
D. L. Miller, Louisville, Ky., Holland pipe cutter.

Hill Pump Valve Co., Chicago, Ill., spring-seated pump valves.

Gamon Meter Co., Newark, N. J., Watch Dog meters, $\frac{3}{8}$ to 6 inch diameters.

Columbia Iron Works, Chattanooga, Tenn., fire hydrant valve and meter box.

Modern Iron Works, Quincy, Ill., curb and meter boxes, flush tank regulators, P. B. M. wireless electric pipe locator. This instrument is for the pur-



REDUCING VALVE FOR WATER MAINS.

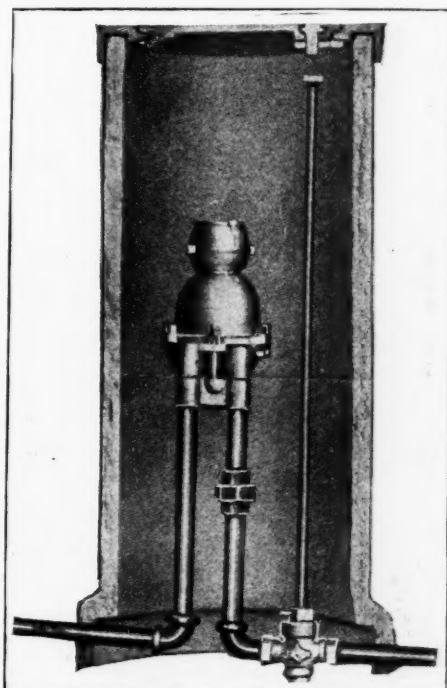
pose of showing the location of any concealed or underground water, gas, steam or other pipe that may be covered with boards, earth, snow, ice or concrete. When properly used it is claimed to be infallible.

Simplex Valve & Meter Co., Philadelphia, Pa., filter rate controller, meter register for ventine or pitot tubes. One of these meters is in use at the Louisville water works.

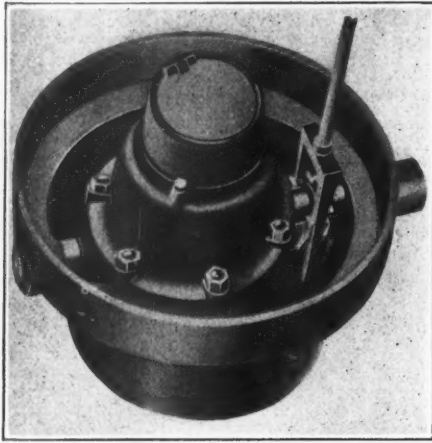
Rensselaer Valve Co., Troy, N. Y., valves and Corey hydrants.

T. D. Bansher, Reading, Pa., lead furnace and patent fuel.

J. Y. Pattison, Pittsburgh, Pa., the Nobolt service box. The name, "Nobolt Cover," describes one of its important features—the elimination of the brass bolts now in common use, and which are so easily broken and a temptation to brass thieves. When such covers are removed or broken off, or the bolts stolen, the boxes fill with dirt and stones, preventing shut-off and necessitating the digging up and replacing of boxes, which has been a common complaint among water and gas people. The Nobolt Cover saves the old boxes and fits perfectly by a twist of the



KENNEDY DUPLEX VERTICAL SPUD WATER METER SETTING.



FORD METER SETTING.

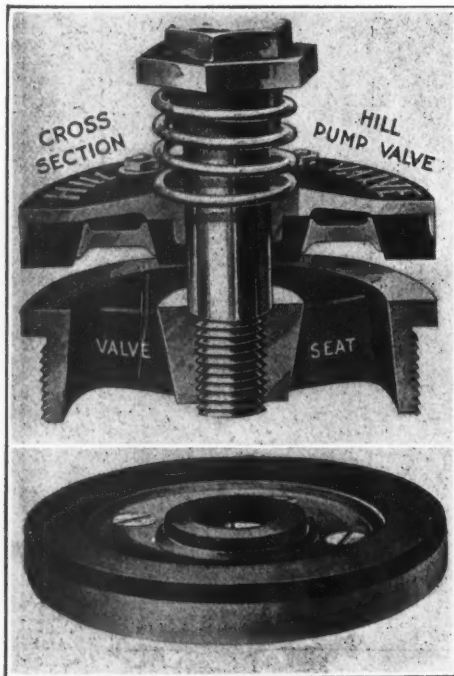
wrist, and is so designed that corrosion is not a factor. As a repair cover it fits old boxes regardless of condition of disrepair, even though the lug in the box is broken or the brass screw broken off and left in the lug. As an original cover for standard boxes it will do away with the brass bolt and with the tapping of the lug.

A. Wyckoff & Sons Co., Elmira, N. Y., wooden water pipes and steam pipe covering.

Thomas Watkins, Johnstown, Pa., Watkins pipe jointer, using an asbestos ring.

C. Lee Cook Mfg. Co., Louisville, Ky., Cooke's metallic packing.

A. H. Kennedy, Rockport, Ind., duplex vertical spud water meter setting. The illustration shows a meter set at the curb, with service cock and rod inside the meter box. This setting is claimed economical and easy to manipulate. To remove the meter, unscrew one little nut that holds the two vertical spuds in the socket cross head and lift out the meter. A $\frac{3}{4}$, $\frac{5}{8}$ or $\frac{1}{2}$ -inch meter can be set in the same socket cross head. The socket cross head can-

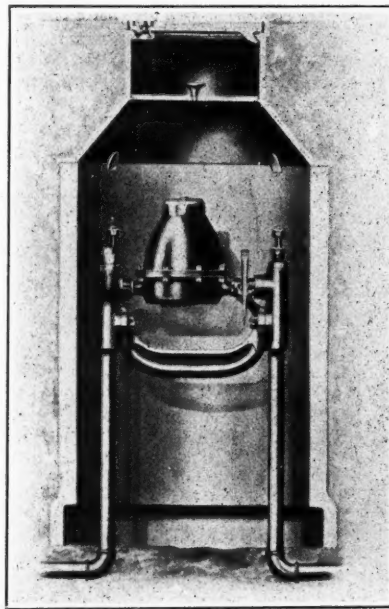


HILL SPRING PUMP VALVE.

not get out of line. When a meter is removed for repairs a by-pass held by nut takes its place.

Water Works Equipment Co., New York, tapping machine, detector phone, for locating leaks; diaphragm pump driven by gasoline engine for contractor's use.

Ford Meter Box Co., Wabash, Ind., cast iron tops for vitrified pipe boxes and meter setting appliances and accessories; the bottom section of a standard Ford meter box showing details of construction with meter in place. The outer ends of inlet and outlet parts are threaded to receive standard $\frac{3}{4}$ -inch pipe. The top and bottom castings are bound together with a tie rod and all metal parts, except the brass connections, are treated with coating material the same as standard cast iron water pipe. The top and bottom castings are cemented to the tile barrel with Portland cement, and the joints coated with



FORD METER SETTING, WILMINGTON PATTERN.

waterproof compound, thus making the whole box water tight. All brass parts are made of high grade metal and wedges of Tobin bronze. Only one placing tool is necessary for any number of meters. The illustration shows a Wilmington pattern setting. In this

the inlet and outlet valve and hose connection on outlet end, so that meter is tested in place by weighing water in portable tank. This idea was suggested to the Ford Meter Box Co. by John A. Kienle, Chief Engineer of Wilmington, Del., and led to inclusion in specifications of city of Wilmington.

Leadite Co., Philadelphia, Pa., sample of leadite and literature. Leadite is a material for jointing iron pipe which weighs less than lead and has some advantages over it.

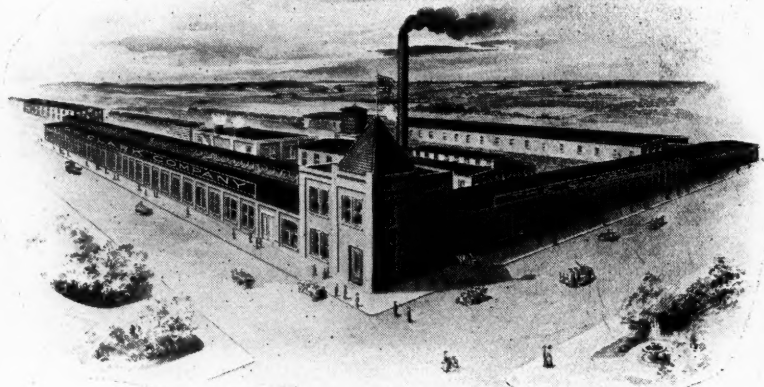
Central Foundry Co., New York, N. Y., sample of Universal pipe.

INDUSTRIAL NEWS

Cast Iron Pipe.—Chicago—4-inch, \$27; 6 to 12-inch, \$25; 16-inch and up, \$24.50. Birmingham—Prices of pipe are higher. Yards are clear of stocks and plants running on full time. Shipments, owing to good weather, are unhampered and heavy. Further price advances are expected by July 1 and will certainly be made if pig iron advances. Quotations: 4 to 6-inch, \$23.50; 8 to 12-inch, \$22.50; over 12-inch, average, \$21.50. New York—Several public lettings are pending in this territory. Private buying is running about the same as for the past few weeks. Quotations: 6-inch, car loads, \$21 to \$23.

Lead.—The expected advance in price has materialized. Quotations: New York, 4.50c.; St. Louis, 4.375c.

Water Works Specialties.—The H. W. Clark Co., Mattoon, Ill., manufacturers of the Clark meter box and other water works appliances, has recently moved their business to a fine new plant occupying five acres of ground. The floor space of the new buildings is over 45,000 square feet. The works consist of foundry and machine shop equipped with the newest and best kinds of machinery and appliances. It is understood that the company will soon add several new water works specialties to their line. The present line, besides meter housings to suit all sorts of conditions, includes Texsagon meter couplings, collapsible iron forms for making concrete housings for meters, Clark deep well pump plungers and sanitary well construction. The company was incorporated about a year ago with a capital of \$50,000. The officers are: H. W. Clark, president; C. H. Tillotson, treasurer, and D. P. Child, secretary.



NEW PLANT OF THE W. H. CLARK CO., MAT TOON, ILL.

Autocar Street Sprinkler.—Louis de M. Blocher, chairman of the Board of Public Works, Pensacola, Fla., in a recent letter said: "I was requested to tell you what our experience is with the automobile street sprinkler. We purchased an autocar street sprinkler at my suggestion to my board, and with some question in their minds as to the practicability and the cost of upkeep. Previously we ran two 500-gallon, two-mule team sprinklers, and did not secure the service we required, and we had to be always careful not to overheat the mules. After a very careful investigation I put the matter up before my board, with the results of getting an autocar, and after running for several months by one of my teamsters, who never had ridden in a gas car, without any adjusting, and with the meager instruction I gave him we find the service far beyond what we ever expected. It covers all the territory of the other wagons and a great deal more, and the cost of running is so little in comparison that we feel that it has been a most judicious investment. I would say, also, that besides this regular work it is used many times at night on extra work in sweeping and cleaning the streets. You would make no mistake in purchasing an autocar if it is work with a minimum cost you want."

New Asphalt Construction Company.—The Union Paving Company of Philadelphia, Pa., has been formed by John M. Mack, until recently president of the Barber Asphalt Company; B. F. Richardson, Philadelphia, of the Richardson-Ross Quarry Company; Joseph P. Mack, 2d, and E. O. Michener. The capital of the new company is \$500,000. John M. Mack is quoted as stating that the object of the new company is to bid for street paving contracts of all kinds and get as much work as possible. It is understood that the Union Company will purchase asphalt from the General Asphalt Company.

Steam Boilers.—The Metropolitan Water and Sewerage Board, Boston, Mass., are to install two 54-inch horizontal return tube boilers with smoke flue furnished by the Robb Engineering Co., South Framingham, Mass.

Street Cleaner.—The Matchless Street Cleaner Company, Troy, N. Y., has issued a new edition to its catalogue describing the Matchless sanitary hand cleaning machine. This device is not to be confused with an ordinary can carrier, although it consists of a can mounted on wheels with an additional device, namely, a dustpan which automatically picks up the sweepings that have been brushed into it and deposits them in the can. The manufacturers state that a workman can keep clean about 50 per cent. more street surface than can be done by the ordinary hand carts where the operator shovels the dirt into the can.

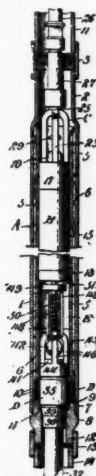
Paving Bricks.—The Central Clay Products Company, North Tonawanda, N. Y., recently incorporated with a capital stock of \$75,000, will construct a large paving and building brick manufacturing plant at Beach Ridge, just east of that city, to cost \$35,000. The plant will consist of ten buildings covering an area 500 feet square; four oblong down draft kilns and a metallic radiation drier will be the principal buildings. H. Jason Knapp, North Tonawanda, is president.

Steel Tanks.—The Petroleum Iron Works Company, Sharon, Pa., steel plate construction, is making some large additions to equipment in its plant, but is not adding any new buildings. It has placed a contract with the Massillon Bridge & Structural Company, Massillon, O., for one crane runway, 70-foot span, 560 feet long, and with the Alliance Machine Company, Alliance, O., for a 15-ton electric traveling crane. It has also purchased one 6-drive, 16-inch x 24-inch Lima switching locomotive, a Hilles & Jones horizontal bending machine, a No. 3 vertical punching machine and a scrap shear from the United Engineering & Foundry Company, Pittsburgh. The yard crane will greatly facilitate and reduce the cost of handling material, and with the new machines the output of the company will be largely increased. It reports business as very good at the present time, some departments operating 20 hours per day.

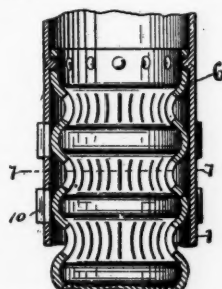
Sewer Pipe.—The Pacific Sewer Pipe Company, Los Angeles, announces plans for an additional plant at Los Nietos, Cal.

PATENT CLAIMS

1,027,665. SELF-CLEANING BALL-VALVE PUMP. Clarence L. Parker, Los Angeles, Cal. Serial No. 587,055. In a pump, the combination of a barrel, a foot valve therein including a ball, a plunger and a cleaning and unseating device for the ball in the path of and in position to be operated by the plunger during its working stroke.



1,028,065. WELL CASING. Andrew Smith, San Mateo, Cal., assignor to Smith Metal Perforating Co., San Mateo County, Cal. Serial No. 489,642. A drainage casing comprising a metal sheet having a series of smooth walled

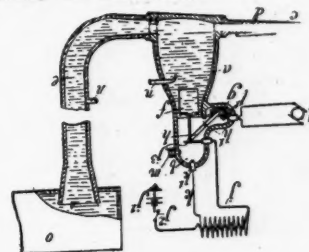


sheared slits therein of less width than the thickness of the sheet.

1,027,430. EXPLOSION APPARATUS FOR RAISING AND FORCING WATER. Graydon Poore and Herbert A. Harvey, London, England. Serial No. 673,555.

In an explosion pumping apparatus in combination, a pump body, a suction pipe, a valve in said suction pipe, a delivery pipe, an explosion chamber in said body,

beans for electrolytically decomposing a portion of the water let into said body for each explosion, means for firing the explosive charge, produced by the decomposition of water, and means operated by the rise of water in the pump body for simultaneously controlling the electrolytic decomposition of water, and the firing of the explosive charge, substantially as described.



1,027,587. SELF-ACTING VALVE FOR PUMPS AND SIMILAR DEVICES. Paul Brenner and Otto Hoffmann, Duisburg, Germany. Serial No. 470,146.

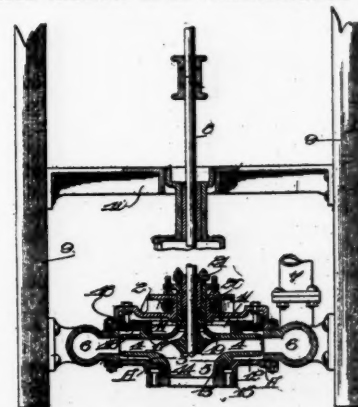
A device of the character described, comprising a casing having an axially disposed inlet port and an annular circumferential outlet port, said casing being provided with a beveled flange at said



outlet port, a rigid annulus freely movable in an axial direction and adapted to engage said flange, and a spring encompassing the casing and made in a separate piece from said annulus, whereby said annulus is adapted to be projected across the outlet port and to recede therefrom without being subjected to bending strain.

1,027,624. AUTOMATIC BALANCE FOR CENTRIFUGAL PUMPS. Albert C. Paulsmeier, Alameda, Cal., assignor to Byron Jackson Iron Works, West Berkeley, Cal., a Corporation of California. Serial No. 649,895.

An automatic hydraulic counterbalance for a centrifugal pump, consisting in the combination of an incased runner, having a central suction inlet and a peripheral discharge; a case in which the runner is revolvable; the runner carrying on one side an annular flange normal to the runner axis; the case bearing a corresponding flange toward and from which the runner flange is movable according to the shifting of the runner axial in the case; said flanges and the runner and casing inclosing a variable pressure chamber on the side opposite to the suction, and which chamber is in communication with



the pump discharge between said flanges, said variable pressure chamber having a discharge back into the runner; and means controlled by the shifting of the runner to vary the discharge from the variable pressure chamber into the runner, and said last-named means constructed and arranged so that, as the flanges move closer together to shut off the supply of water from the pump discharge into the variable pressure chamber, the discharge opening from the variable pressure chamber back into the runner is increased; and vice versa, when the flanges move apart to increase the water supply to the variable pressure chamber from the pump discharge, the discharge opening from the variable pressure chamber back into the runner is decreased.

THE WEEK'S CONTRACT NEWS

Relating to Municipal and Public Work—Street Improvements—Paving, Road Making, Cleaning and Sprinkling—Sewerage, Water Supply and Public Lighting—Fire Equipment and Supplies—Bridges and Concrete Work—Sanitation Garbage and Waste Disposal—Police, Parks and Miscellaneous—Proposals and Awards.

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also corrections of any errors discovered.

BIDS ASKED FOR

STATE	CITY	RECEIVED UNTIL	NATURE OF WORK.	ADDRESS INQUIRIES TO
STREET IMPROVEMENTS				
Georgia.....	Athens.....	June 24.....	Constrn. number of roads.....	J. L. Emerson, Sec'y Comr.
Iowa.....	Waterloo.....	June 24, 7.30 p.m.....	Constrn. cement sidewalks.....	R. L. Degon, City Clk.
Massachusetts.....	Everett.....	June 24, 7.30 p.m.....	Furn. binder for macadam roads.....	Wm. Walker, Chm. Bd. Pub. Wks.
Pennsylvania.....	Etna.....	June 24, 5 p.m.....	Constrn. 4,870 yds. vit. blocks.....	J. C. Armstrong, Boro. Clk.
Alabama.....	Chatom.....	June 24, 3 p.m.....	Constrn. 8 miles top-soil road.....	W. S. Keller, State Highway Engr.
Wisconsin.....	Oshkosh.....	June 24, 2 p.m.....	Constrn. macadam roadway.....	R. A. Hollister, Chm. Bd. Pub. Wks.
Delaware.....	Marcus Hook.....	June 24, 8 p.m.....	Constrn. 10,600 yds. bituminous pav't.....	C. H. Casey, Chm. Comm.
Ohio.....	Maumee.....	June 24, noon.....	Pavg. a number of streets.....	D. V. Rabb, Vil. Clk.
Ohio.....	Upper Sandusky.....	June 24, noon.....	Constrn. 10,900 sq. yds. paving.....	G. M. Fleck, City Clk.
Washington.....	Everett.....	June 24.....	Imp. roads.....	County Comm.
California.....	Los Angeles.....	June 24, 2 p.m.....	Constrn. sidewalks, driveways and curbs.....	H. J. Leland, Clk.
New York.....	White Plains.....	June 24, 8 p.m.....	Constrn. sidewalks.....	Trustees.
Virginia.....	Bedford City.....	June 24, noon.....	Constrn. 2 miles macadam.....	City Clerk.
Iowa.....	Burlington.....	June 24, 9 p.m.....	Constrn. wood block and vit. block pav't.....	H. G. Vollmer, City Engr.
Canada.....	Pt. Arthur, Ont.....	June 24, 5 p.m.....	Constrn. 9,198 sq. yds. paving & 3,530 lin. ft. curb & gutter	J. J. Hackney, Comr. Utilities.
Utah.....	Salt Lake City.....	June 24, 10 a.m.....	Improving 2 miles of sts, grad'g, pay'g & curb'g with asph.	Bd. Comrs.
Ohio.....	Hamilton.....	June 24.....	Paving and imp. streets and laying sidewalks.....	J. A. Holzberger, D. P. S.
Ohio.....	Wooster.....	June 25, noon.....	Grading 7 streets, 36,553 cu. yds.....	City Council.
Iowa.....	Clarinda.....	June 25, 7.30 p.m.....	Constrn. cement pav'ts.....	C. W. Stuart, City Clk.
California.....	Sacramento.....	June 25.....	Constrn. 37.4 miles oil and asphalt macadam road.....	Highway Commission.
Ohio.....	Dayton.....	June 25.....	Pavg. Forest avenue.....	Dir. Public Service.
Tennessee.....	Chattanooga.....	June 25.....	Constrn. 3 concrete culverts.....	G. R. Brown, Chm. Road Comm.
Ohio.....	Marietta.....	June 25, 1 p.m.....	Constrn. 1 mile bituminous concrete.....	County Comm.
Ohio.....	Mansfield.....	June 25, noon.....	Constrn. 2 miles macadam.....	County Comm.
Delaware.....	Wilmington.....	June 25.....	Constrn. macadam roads.....	The Levy Court.
Connecticut.....	Wallingford.....	June 25.....	Constrn. 5,800 yds. macadam & 15,000 yds. bit. macadam.....	W. A. Mackenzie, Boro. Engr.
Ohio.....	Columbus.....	June 25.....	Furn. 285 tons refined asphalt.....	S. A. Kinnear, Dir. Pub. Serv.
Pennsylvania.....	Pittsburg.....	June 25, 2 p.m.....	Constrn. creosoted wood or carbolineum roadway on bridge.....	R. J. Cunningham, County Compt.
Washington.....	Aberdeen.....	June 26.....	Constrn. 12,000 yds. pav't.....	C. W. Ewart, City Engr.
Alabama.....	Carrollton.....	June 26, 4 p.m.....	Constrn. 4 miles sand clay roads.....	W. S. Keller, State Highway Engr.
Indiana.....	Fort Wayne.....	June 26, 10 a.m.....	Constrn. culverts and bridge floors.....	C. H. Brown, County Aud.
New Jersey.....	Trenton.....	June 26, 2.30 p.m.....	Repavg. with vit. brick.....	H. B. Salter, City Clk.
Ohio.....	Toledo.....	June 26, noon.....	Constrn. pav't in several streets.....	F. G. Stockton, Dir. Pub. Serv.
Ohio.....	Youngstown.....	June 26, noon.....	Constrn. 1.29 miles macadam and 1.17 miles brick roads.....	County Comm.
Alabama.....	Wedowee.....	June 26.....	Grading, draining, and surfacing with sand clay, State Aid Road; estimated cost, \$10,000.....	Bd. Comrs.
Maryland.....	Baltimore.....	June 26.....	Constrn. a number of streets with sheet asphalt, vitrified and granite block; 3 contracts.....	C. A. Edel, Sec. Paving Comm.
Ohio.....	Portsmouth.....	June 27.....	Constrn. white gravel road, Madison Twnshp, length 6,400 ft.....	T. C. Patterson, Co. Aud.
Ohio.....	Cleveland.....	June 27, noon.....	Constrn. .5 mile brick.....	County Comm.
Michigan.....	Bay City.....	June 27.....	Pavg several streets.....	R. O. Woodruff, Chm. Bd. Pb. Wks.
Illinois.....	Westport.....	June 27, 2 p.m.....	Constrn. gravel roads.....	P. G. Little, Chm. Comm.
New Jersey.....	Passaic.....	June 27, 10.30 a.m.....	Constrn. 11,175 sq. yds. pav't on concrete.....	W. A. Reid, Dir. Dept. Sts. & Pb. Imp.
West Virginia.....	Parkersburg.....	June 27, 10 a.m.....	Constrn. pav'ts on 8 streets.....	Frank Good, City Clk.
Ohio.....	Cincinnati.....	June 28, noon.....	Constrn. concrete culvert.....	County Comm.
Indiana.....	Greensburg.....	June 28, 1 p.m.....	Constrn. gravel roads.....	L. W. Sand, County Aud.
New Jersey.....	Hackensack.....	June 28, 11 a.m.....	Constrn. macadam and asphalt macadam road.....	H. A. Shuart, Clk. Freeholders.
Ohio.....	Elyria.....	June 28, 10 a.m.....	Constrn. .9 mile bituminous treated macadam.....	County Comm.
Indiana.....	Greencastle.....	June 29.....	Constrn. gravel and macadam roads.....	C. L. Airhart, County Aud.
Virginia.....	Lynchburg.....	June 29, noon.....	Constrn. macadam road.....	J. T. McKinney
Indiana.....	Fowler.....	July 1, 1 p.m.....	Constrn. stone roads.....	L. Shipman, County Aud.
Minnesota.....	Minneapolis.....	July 1.....	Constrn. 1 mile concrete road.....	A. P. Erickson, County Aud.
New Jersey.....	Elizabeth.....	July 1.....	Constrn. 7,000 yds. brick pav't and 4,800 yds. trap block pav't	W. P. Neafsey, Street Comm.
Ohio.....	New Philadelphia.....	July 1, 1 p.m.....	Pavg. with brick.....	W. C. Shott, County Aud.
Indiana.....	Huntington.....	July 1.....	Constrn. 2.92 miles highway.....	Harold Guthrie, County Aud.
Missouri.....	Hannibal.....	July 1.....	Constrn. 36,000 yds. brick and 18,000 yds. Hassam pav't.....	C. F. Hayes, Mayor.
Ohio.....	Ulrichsville.....	July 1, 1 p.m.....	Constrn. brick-paved road.....	W. C. Shott, County Aud.
Illinois.....	Decatur.....	July 1.....	Constrn. 20,000 yds. brick pav't.....	R. L. McCalman, City Engr.
Indiana.....	Covington.....	July 2, 1.30 p.m.....	Constrn. gravel roads.....	W. B. Gray, County Aud.
North Dakota.....	Ellendale.....	July 2.....	Grad. bridge approach.....	V. E. Haskins, County Aud.
Indiana.....	Crawfordsville.....	July 2, 10 a.m.....	Imp. a number of highways.....	B. D. Engle, County Aud.
Ohio.....	Mount Gilead.....	July 2, 11 a.m.....	Constrn. roads.....	Clifton Sipe, County Aud.
New York.....	Peekskill.....	July 2.....	Constrn. brick and asphalt block pav't, 10,000 yds.....	Board of Trustees.
New York.....	Mount Vernon.....	July 2, 5 p.m.....	Pavg. Claremont avenue.....	E. W. Fiske, Mayor.
Indiana.....	Vincennes.....	July 2, 2 p.m.....	Constrn. gravel roads.....	J. T. Scott, County Aud.
Indiana.....	Crown Point.....	July 2, noon.....	Constrn. gravel roads.....	C. A. Johnson, County Aud.
Mississippi.....	Amory.....	July 2, 2 p.m.....	Constrn. 12 miles gravel road.....	A. B. Cowden, Sec'y Comm.
Alabama.....	Calera.....	July 2, noon.....	Constrn. 4 miles chert road.....	County Comm.
Alabama.....	Scottsboro.....	July 3, 11 a.m.....	Resurfac. with chert on macadam.....	W. S. Keller, St. Highway Engr.
Indiana.....	Evansville.....	July 3, 10 a.m.....	Imp. and paving highway.....	H. W. Hartig, Chm. Comrs.
New Jersey.....	Paterson.....	July 3, 2 p.m.....	Constrn. asphalt concrete on Pompton turnpike.....	W. H. Mason, Chm. Comm.
Indiana.....	Winchester.....	July 3.....	Constrn. a number of highways.....	County Comm.
Oregon.....	Fossil.....	July 3, 1 p.m.....	Constrn. roads and bridges.....	H. F. C. Heidtmann, County Surv.
Indiana.....	Lafayette.....	July 3, 10 a.m.....	Constrn. gravel roads.....	D. W. Baxter, County Aud.
Ohio.....	Cincinnati.....	July 5, noon.....	Repair roads.....	Stanley Struble, Pres. Comm.
Indiana.....	South Bend.....	July 8, 10 a.m.....	Constrn. macadam roads.....	Clarence Sedwick, County Aud.
Alabama.....	Livingston.....	July 8, noon.....	Surfac. 3 1/2 miles road with chert.....	County Comm.
Pennsylvania.....	Steelton.....	July 8, 7.30 p.m.....	Imp. and paving Pine street.....	C. P. Feidt, Boro. Sec'y.
Indiana.....	Fowler.....	July 8, 11 a.m.....	Constrn. stone roads; cost, \$5,100.....	Samuel Shipman, County Aud.
Alabama.....	Red Bay.....	July 9, 5.30 p.m.....	Constrn. 3 1/2 miles gravel road.....	County Comm.
Kansas.....	Leavenworth.....	July 11, 5 p.m.....	Constrn. curbing and grading.....	J. H. Kirmeyer, City Clk.
Wisconsin.....	Edgerton.....	July 13, 10 a.m.....	Constrn. asphalt macadam pav't.....	H. B. Knapp, City Clk.
Alabama.....	Wetumpka.....	July 19, noon.....	Constrn. 4 miles gravel road.....	County Comm.
Ohio.....	Cambridge.....	July 20, noon.....	Constrn. 12,250 yds. vit. block paving.....	K. M. Cosgrove, Chief Engr.
SEWERAGE				
Wisconsin.....	Cudahy.....	June 24, 8 p.m.....	Constrn. concrete and clay pipe sewers.....	J. C. Dretzka, City Clk.
New Jersey.....	Westfield.....	June 24.....	Constrn. 13,600 ft. 8 to 15-in. clay pipe sewer, etc.....	A. W. Vars, Town Engr.
New Jersey.....	Newark.....	June 24, 3 p.m.....	Constrn. 6,500 ft. stoneware pipe, etc.....	Jas. Owen, County Engr.
Louisiana.....	Opelousas.....	June 25, 10 a.m.....	Constrn. 10 miles 6 to 18-in. pipe sewers & disposal plant.....	Comm. First District.
New Jersey.....	Newark.....	June 25, 2 p.m.....	Constrn. section 15, Passaic Valley sewer.....	W. G. Kirkpatrick, Engr., Birmingham, Ala.
Arkansas.....	Van Buren.....	June 25, noon.....	Constrn. 25,000 6 to 12-in. vit. pipe, etc.....	Sewerage Comm.
				E. L. Matlock, Sec'y Comm.

BIDS ASKED FOR

STATE	CITY	RECEIVED UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
Missouri.....	St. Louis.....	June 28, noon.....	Constrn. North Harlem Joint Dist. sewer—First section.....	City St. Louis, Rm. 300, City Hall.
Wyoming.....	Torrington.....	June 29, 10 a.m.....	Constrn. sanitary sewer system.....	C. D. Brubaker, City Clk.
Kansas.....	Independence.....	June 30.....	Constrn. ½-mile 24-in. to 4-ft. monolithic or brk storm sewers	A. H. Kriehagen, City Clk.
Arkansas.....	Russellville.....	July 2.....	Constrn. sewer system; cost, \$30,000.....	J. T. Bullock, Mayor; E. A. Kingsley, Engr., Little Rock.
Texas.....	Beaumont.....	July 2, 10 a.m.....	Constrn. conc. & vit. pipe sewers, 8-in. to 7½ ft. diameter..	E. A. Fletcher, Mayor.
New York.....	Mount Vernon.....	July 2, 5 p.m.....	Constrn. sewers, drains and receiving basins.....	E. W. Fiske, Mayor.
New York.....	Brooklyn.....	July 3, 11 a.m.....	Constrn. concrete sewers.....	A. E. Steers, Boro. Pres.
Ohio.....	Cambridge.....	July 6.....	Constrn. 8,700 ft. clay pipe and 600 ft. c. i. pipe sewer; also ejector.....	K. M. Cosgrove, City Engr.
Montana.....	Chinook.....	July 6.....	Constrn. main sewer system.....	F. D. Oreson, Town Clk.
Connecticut.....	Hartford.....	July 8.....	Install. pumping equipment.....	Jos. Butts, Sec'y Bd. Contract.
Ohio.....	East Youngstown.....	July 15.....	Constrn. sewers in several streets.....	P. J. Carney, Clk.
Iowa.....	Burlington.....	July 20.....	Constrn. concrete arch sewer; cost, \$50,000.....	H. G. Vollmer, City Engr.
WATER SUPPLY				
Nebraska.....	Mason City.....	June 24, 8 p.m.....	Constrn. water mains, hydrants and standpipe.....	J. T. Wood, Vil. Clk.
Ohio.....	Akron.....	June 24, noon.....	Furn. about 2,000 tons c. i. pipe and 62 gate valves.....	R. M. Pillmore, Dir. Pub. Serv.
New York.....	East Williston.....	June 24.....	Constrn. 12,000 ft. 4 to 8-in. c. i. pipe, etc.....	F. L. Oakley, Comm.
New York.....	White Plains.....	June 24.....	Constrn. water main.....	Water Comm.
Canada.....	Kerrisdale, B. C.....	June 24.....	Constrn. 8 miles 4 to 18-in. steel pipe.....	H. Floyd, Clk. Council.
Oklahoma.....	Kenefick.....	June 24.....	Constrn. water works; cost, \$14,000.....	W. E. Strickland, Clk.
Nebraska.....	North Platte.....	June 25.....	Furn. 200 tons c. i. pipe, hydrants, valves, etc.; also digging trench and laying pipe.....	H. S. Welsh, Water Comm.
New Jersey.....	Stanhope.....	June 25.....	Constrn. water works.....	A. S. Van Arsdale, Mayor.
North Dakota.....	Beach.....	June 25.....	Constrn. water works; cost, \$25,000.....	M. A. Egan, City Aud.
Indiana.....	Bedford.....	June 26.....	Constrn. sedimentation basin; cost, \$14,000.....	J. W. Malott, Supt.
New York.....	Greenburg.....	June 26, 8 p.m.....	Constrn. water system for Hartsdale district.....	Townsend & Co., Engrs., Hartsdale.
Utah.....	Logan City.....	June 27, 5 p.m.....	Furn. 2½ miles 2 to 6-in. metal pipe.....	G. W. Lindquist, Comm.
Wyoming.....	Torrington.....	June 29, 10 a.m.....	Constrn. water system and sanitary sewer system.....	C. D. Brubaker, City Clk. & Shepard Engineering Co., Majestic Bldg., Denver, Colo.
Nebraska.....	McCook.....	July 1, 6 p.m.....	Constrn. 7,300 ft. 2 and 4-in. iron pipe.....	L. C. Stoll, City Clk.
Vermont.....	St. Albans.....	July 1, 8 p.m.....	Constrn. earthen dam and reservoir and laying abt. 3 miles 12 to 15-in. water pipe.....	D. F. McCarthy, City Engr.
Colorado.....	De Beque.....	July 1.....	Install. water works; cost, \$20,000.....	L. Stumberg, Mayor; C. D. Vail, Denver, Colo.
Ohio.....	Bexley.....	July 1 (about).....	Constrn water and sewer system.....	F. D. Chamberlin, Mayor.
Iowa.....	Storm Lake.....	July 2.....	Furn. 5,000 ft. 4-in. pipe hydrants, gates, etc.....	H. H. Steffen, City Clk.
Maryland.....	Westernport.....	July 2, noon.....	Constrn. water works.....	O. H. Bruce, City Clk.
Mississippi.....	Biloxi.....	July 2, 8 p.m.....	Constrn. extensions.....	E. Barq, Chm. Comm.
Indiana.....	Columbus.....	July 2.....	Constrn. mechanical water filter.....	City Clerk.
Louisiana.....	New Orleans.....	July 8, 3 p.m.....	Furn. sluice gates.....	F. S. Shields, Sec. Sew. & Wat. Bd.
Texas.....	Dallas.....	July 24 (about).....	Constrn. water filtration plant.....	Commissioners.
Spain.....	Madrid.....	July 31.....	Constrn. filtration and purification plant.....	Canal Commission.
LIGHTING AND POWER				
Ohio.....	Salem.....	June 27, noon.....	Install. street lighting system.....	D. H. Rummell, Dir. Pub. Serv.
Ohio.....	Oxford.....	June 28, noon.....	Furn. and setting steam boiler.....	Bailey Engineering Co., Alliance, O.
Illinois.....	Champaign.....	July 1.....	Constrn street lighting system, including 64 standards.....	H. A. Dermont, Clk. Trustees.
New York.....	Walden.....	July 1 (about).....	Furn. gas plant for lighting and heating.....	N. M. Woodward, City Clk.; J. R. Crevath, Engr., Chicago.
Pennsylvania.....	Philadelphia.....	July 1.....	Lighting with mantle lamps, burning naphtha or other illuminating oil. Furn. lamp posts.....	Ezra Young, Vil. Clk.
Dist. Columbia.....	Washington.....	July 8, 10, 30 a.m.....	Furn. elec. equipment for hydro-electric station at Gutan.....	M. L. Cooke, Dir. Pub. Wks.
Indiana.....	Kendallville.....	July 10.....	Furn. equipment for elec. light plant.....	Major F. C. Boggs.
FIRE EQUIPMENT				
Iowa.....	Council Bluffs.....	June 24, 5 p.m.....	Furn. comb. hose and chemical auto truck.....	C. J. Duff, City Clk.
Pennsylvania.....	Windber.....	June 24, 7 p.m.....	Furn. motor-driven chemical and hose wagon.....	W. G. Butterbaugh.
Ohio.....	Akron.....	June 25, noon.....	Furn. auto apparatus.....	D. P. Stein, Dir. Pub. Safety.
Oregon.....	Portland.....	June 27.....	Furn. auto aerial truck, pump, engine, 8 comb. wagons.....	Executive Board of F. D.
Dist. Columbia.....	Washington.....	June 27, 2, 30 p.m.....	Furn. fire hose.....	Major F. C. Boggs.
Washington.....	Seattle.....	June 28, 10 a.m.....	Furn. two 4-passenger auto runabouts.....	C. E. Bagley, Sec'y Bd. Pub. Wks.
New York.....	New Rochelle.....	July 2, 8 p.m.....	Constrn. fire escapes.....	Board of Education.
BRIDGES				
Pennsylvania.....	Allentown.....	June 24.....	Constrn. viaduct.....	Lehigh Valley Transit Co.
California.....	Los Angeles.....	June 24.....	Constrn. concrete bridge.....	H. J. Leland, Clk. Superv.
Virginia.....	Houston.....	June 24, noon.....	Constrn. 4 steel and 1 concrete bridge.....	City Clerk.
Pennsylvania.....	Ridgway.....	June 25, noon.....	Constrn. reinforced concrete bridge.....	F. W. Ward, Boro. Engr.
Ohio.....	Cleveland.....	June 26, 11 a.m.....	Constrn. bridges and culverts.....	J. F. Goldenbogen, County Clk.
Indiana.....	Greencastle.....	June 29, 11 a.m.....	Constrn. 2 bridges.....	C. L. Airhart, County Aud.
Kansas.....	Leavenworth.....	July 1, noon.....	Constrn. and repairing a number of bridges.....	F. A. Hall, County Clk.
Mississippi.....	Gulfport.....	July 1.....	Constrn. 2 bridges.....	J. S. Hewes, Clk.
Florida.....	Fort Myers.....	July 2, noon.....	Constrn. reinforced concrete bridge.....	County Comm.
Ohio.....	Cleveland.....	July 3, 11 a.m.....	Constrn. concrete bridge.....	J. F. Goldenbogen, Clk.
New York.....	Phoenix.....	July 5, 2 p.m.....	Constrn. concrete bridge.....	Town Clerk.
MISCELLANEOUS				
Nevada.....	Reno.....	June 24.....	Furn. 10-ton steam roller, 10-ton traction engine, 10-ton roller & traction engine; also 1,000-gal. sprinkling wagon with gasoline motor.....	W. A. Fogg, Clk. Comr.
Michigan.....	Detroit.....	June 25.....	Furn. 4 boilers and stokers.....	Water Board.
Alabama.....	Andalusia.....	June 25.....	Bldg. county jail.....	Board of Revenue.
Arizona.....	Phoenix.....	June 25.....	Furn. concrete mixer.....	Board of Control.
Canada.....	Saskatoon, Sask.....	June 25.....	Furn. 70-ton incinerator.....	City Commissioners.
Wisconsin.....	Two Rivers.....	June 26, 7, 30 p.m.....	Constrn. dock.....	Board Public Works.
New York.....	Brooklyn.....	June 27, 3 p.m.....	Constrn. bronze work.....	C. B. Stover, Pres. Park Comr.
Ohio.....	Cincinnati.....	June 28, noon.....	Furn. crushed stone.....	County Comr.
Dist. Columbia.....	Washington.....	June 29, 11 a.m.....	Constrn. reinforced concrete floor, balcony, stairs, etc., at Fort Lafayette, N. Y.....	Navy Department.
Kentucky.....	Winchester.....	July 5, 7, 30 p.m.....	Bldg. city hall.....	J. A. Hughes, Mayor.
Dist. Columbia.....	Washington.....	July 6, 11 a.m.....	Furn. 4 electric and 18 hand-operated traveling cranes.....	Navy Department.
Dist. Columbia.....	Washington.....	July 13, 11 a.m.....	Constrn. ice-making and refrigerating plant.....	Navy Department.
Texas.....	Dallas.....	July 15, 2 p.m.....	Constrn. city hall; cost, \$400,000.....	City Commissioners.
Alabama.....	Anniston.....	July 16.....	Constrn. jail.....	County Comr.

STREET IMPROVEMENTS

Huntsville, Ala.—Huntsville Good Roads Club has decided to oil model State highway which has just been completed from city limits to Normal.

New Decatur, Ala.—New Decatur will shortly commence work on building of new sidewalks in East New Decatur, which will cost over \$4,000. Walks will be built of cement.

Los Angeles, Cal.—On recommendation of City Engineer Homer Hamlin, Board of Public Works have sent communication to council asking that it pass ordinance providing for immediate improvement of Washington st. between Western ave. and old city limits.

Los Angeles, Cal.—Citizens are planning to open Holly st., from Vernon ave. to Los Robles ave.

Pomona, Cal.—In spirited election \$36,000 bond issue for improvement of roads was carried by voters of Lordsburg. Permanent asphalt pavement will be established through Lordsburg and connecting Pomona and San Dimas.

Redondo Beach, Cal.—Petition is being circulated among business men asking that Diamond st., from Gertrude to Pacific, be paved with concrete base and as-

phalt wearing surface. This petition will be presented to City Council next Monday night.

San Pedro, Cal.—Commission has directed Homer Hamlin, city engineer, to prepare specifications for the proposed highway along Pacific ave and 14th st. This includes provisions for 20-foot macadam highway along two streets named and grade not greater than 5 per cent. Engineer Vincent said these specifications would be completed in two or three weeks.

Bristol, Conn.—Survey that has been in progress for two weeks of proposed change in highway on Terryville rd., which is portion of Hartford-Waterbury trunk line, has been completed and engineer, D. Frank Crowley, is preparing plans and specifications.

Bristol, Conn.—It has been voted to install permanent pavement on Main st., from Gridley house corner to bridge over Pequabuck River.

Wilmington, Del.—Paving of French st. with bitulithic is contemplated.

Wilmington, Del.—Levy Court has approved plans and specifications of Highway Commissioner Price for following roads: Tybout's Corner to Bear Station rd.; Kirkwood to St. George's rd.; Price's Corner to the Kennett Turnpike road; Ginn's Corner towards Blackbird road. Birdsboro trap rock will be used in the construction of these roads.

Atlanta, Ga.—Proposition to appropriate \$25,000 toward widening of Peachtree st., from Ellis st. to Baker st., is now pending before Finance Committee of City Council.

Atlanta, Ga.—Improvement of Forsyth st. is being planned.

Peoria, Ill.—At meeting of City Planning Committee, Engineer Dunn was instructed to prepare tentative plans for proposed Dry Run blvd. connecting with Bradley Park.

Indianapolis, Ind.—Resolutions have been adopted for improvement of various streets.

Indianapolis, Ind.—Henry W. Klausmann, City Engineer, has completed plans for paving Martindale ave., from Roosevelt ave. to 16th st. Estimated cost, based on wooden block material, is \$11,900. Board of Public Works is expected to adopt plans.

Indianapolis, Ind.—Henry W. Klausmann, City Engineer, has been directed by Board of Public Works to prepare plans for resurfacing Georgia st., from Illinois st. to Kentucky ave.

Jonesboro, Ind.—County Commissioners have granted petition for improvement of Water st. and Sixth st. in this city with crushed stone and tarvia. Water st. will be made 20 ft. wide and Sixth st. 16 ft. wide. These roads will join with improved roadways leading both north and south of town.

Michigan City, Ind.—Board of Public Works has passed resolution ordering construction of number of sidewalks on various streets.

Mishawaka, Ind.—Petition for paving Washington, Niles, Homewood and North Merrifield aves. has been granted by Board of Public Works in session in City Hall. Resolutions to that effect have been adopted.

Mishawaka, Ind.—Petition for improving of highway which is connecting link between improved road and corporation has just been filed in office of County Auditor for action by County Commissioners. Petitions call for paving with crushed granite and limestone binder portion of Edwardsburg rd. connecting city of South Bend with portion now under improvement, which begins at Portage Township line and runs to county boundary.

Vincennes, Ind.—Board has passed resolution calling for improvement of Parkinson st., from 13th to 15th, with grading and graveling of the roadbed and sidewalk.

Vincennes, Ind.—Auditor Scott has been ordered by Commissioners to advertise for bids for letting of contract at the July term for building of gravel road extension petitioned for by Albert Latshaw.

Des Moines, Ia.—Bitulithic paving promoters secured passage of petition through Council for paving of West 17th st., from University ave. to Crocker st. with new material. Asphalt people were successful in securing passage of resolution for paving of 21st st., from Forest ave. to College ave.

Des Moines, Ia.—Bids for new paving of East Ninth st., between Thompson and Hull ave., have been ordered advertised for by City Council. Specifications are such as to provide for bids on various kinds of material.

Fort Dodge, Ia.—City Council has ordered clerk to advertise for bids on 10 blocks of brick pavement. Brick will be laid over several alleys.

Leavenworth, Kan.—Ordinance has been passed providing for regrading and curbing of Prospect st., from west line of Fifth ave. to east line of Sixth ave. Albert Dorge, Mayor.

Lexington, Ky.—Ordinances have been passed providing for improvement of great number of streets.

Baltimore, Md.—Taxpayers of Second District of Baltimore County will meet to consider proposition of County Commissioners to appropriate \$4,000 to resurface Liberty road from Old Court road to North Branch, distance of seven miles.

Baltimore, Md.—Complying with provisions of ordinance for paving of Falls-way, passed recently by City Council, placing paving, designing laying out of all approaches, viaducts and bridges of new thoroughfare in hands of City Engineer, Mr. McCay has announced his plans for construction of great boulevard.

Holyoke, Mass.—Report of Highway Committee recommending appropriation of \$30,000 for improvements on streets and on Williamansett bridge has been presented to Aldermen and accepted. Report was on advisability of macadamizing Summer, Graton, Exchange, Springfield, Grove, Front and Columbia sts., and expense was set at about \$25,000.

Lawrence, Mass.—Sprinkling of oil on streets to keep down dust will be introduced in this city. Alderman Hannagan has contracted with Standard Oil Co. to send two carloads of oil here to furnish auto sprinkler and to oil streets in residential and outlying districts of Lawrence for 1½ cts. a sq. yd.

Lowell, Mass.—Municipal Council has voted to borrow somewhere in vicinity of \$90,000 for street paving and macadamizing.

Grand Rapids, Mich.—Bids on two patented pavements will be asked by Board of Public Works for Plainfield ave. improvement and so-called open specifications will not be considered.

Duluth, Minn.—Paving of First st., from 21st ave. west to Gilbert st., is being planned.

Duluth, Minn.—Board of Public Works has been ordered to receive bids for resurfacing of Central ave., West Duluth, between Roosevelt and Cody sts., and for paving 21st ave. west. Estimated cost of former is \$24,217 for brick and \$26,000 for creosote blocks; and for latter, \$25,500 for brick and \$30,178 for sandstone blocks.

St. Paul, Minn.—Board of Public Works has rejected all bids received for paving of Fourth and Fifth sts.

Edwardsville, Mo.—Edwardsville Board of Local Improvements has adopted resolution providing for ordinance for construction of about four miles of granitoid sidewalks at cost of \$17,000. Proposed ordinance will provide for bonds to be issued by city permitting property owners to pay in 10 instalments.

Maryville, Mo.—Union Township, in which is located Hopkins and Pickering, has voted to issue \$15,000 bonds for permanent road work.

St. Louis, Mo.—Improvement of King's Highway and Euclid Park is being discussed.

St. Louis, Mo.—Three bids for asphalt paving have been rejected by Board of Public Improvements and orders issued for re-advertising for bids. It was stated that bids were considered too high. They were as follows: Osceola st., between Broadway and Virginia ave., \$17,273.45; Trinidad Asphalt Manufacturing Co.; North Market st., between Goodfellow and Hamilton aves., Trinidad Asphalt Manufacturing Co., \$6,325.06; Parker Washington Co., of West Virginia, \$6,776.95. Figures named represent bids on asphalt only and do not include bids for construction.

Butte, Mont.—Construction of permanent walks have been ordered on large number of streets.

Camden, N. J.—Camden County Board of Freeholders has adopted resolution under which 16 ft. of Main st., Haddonfield, as part of King's Highway, will be paved by county. Balance will be paved by borough, with aid of State, the Public Service Corporation paving along its tracks.

Elizabeth, N. J.—Resolutions have been passed authorizing paving of Morris ave., from Elizabeth city line to Stuyvesant ave., Union Township; Westfield ave., in Springfield Township; South ave., in Fanwood Township, and Springfield ave., in Springfield Township, after prepared plans have been approved by State Road Commissioner.

Glassboro, N. J.—Township Committee has ordered main streets sprinkled daily.

Haddonfield, N. J.—Committee comprising 20 representative citizens of Haddonfield, have waited on members of Stone Road Committee of County Board of Freeholders to urge improvement of Main st., known throughout State as King's Highway.

Newark, N. J.—For purpose of getting Board of Works to lay aside \$10,000 for repair of sidewalks throughout city, West Newark Improvement Association has decided to solicit aid of various local improvement bodies.

Ocean City, N. J.—Meeting of Board of Trade will be held to take action on steps to be pursued in matter of building of proposed Ocean City boulevard, construction of which has been held up by decision of State Supreme Court.

Perth Amboy, N. J.—Street Commissioner has been authorized to purchase quantity of non-asphalt road oil at 5½ cts. per gal.

Perth Amboy, N. J.—Extension of Miller st. southward, to connect with William st., is being planned.

Bay Shore, L. I., N. Y.—Bids are to be advertised for resurfacing five miles of South Country rd., between here and Babylon.

Brooklyn, N. Y.—President Connolly has secured passage by Board of Estimate of resolutions for improvement of four highways as follows: Broadway, Flushing, from Murray lane, village of Flushing, to 10th st., Bay Side, three miles; Corona ave., Corona, between Strong's causeway and Broadway, 2½ miles; Metropolitan ave., from Dry Harbor rd. to Fulton st., Jamaica, four miles; Strong's causeway, from Corona ave. to Lawrence st., 1½ miles; Strong's causeway, from Corona ave. to Lawrence st., 1½ miles. Specifications for above 11 miles of highways estimated to cost about \$175,000, will be prepared at once and ready for bidders in about 10 days.

Canandaigua, N. Y.—Resolution is being considered for construction of improved roadway about five miles in length from point near Clifton Springs at Carmichael's Corners by way of Rockefeller's Corners and Woodhouse's Corners northerly to county line. Cost of road is estimated at \$26,000.

Gouverneur, N. Y.—Village President Fred B. Fuller and his associates on Village Board are contemplating curbing of entire space about village park with cement.

Lockport, N. Y.—Lowest bid received for grading and paving of Locust st. was that of Burgard Co., as follows: Contract complete, \$51,526.56; per sq. yd., \$2.20. Other bids were: Barber Co., contract complete, \$51,932.26; per sq. yd., \$2.22; Union Co., contract complete, \$58,351; per sq. yd., \$2.25.

Mechanicville, N. Y.—Village Board has adopted necessary resolutions to call special election of taxpayers to vote on proposition to pave Viall st., Canal st., Second and Third aves., portion of Fourth ave., and portion of Park ave., and Terminal st. with macadam, with tarvia binding.

Poughkeepsie, N. Y.—Resolutions have been adopted by Street Board ordering paving of Mill st., from North Hamilton to Garden with sheet asphalt and paving of Washington st., from Mansion to north side of Parker ave. with vitrified brick with tar joints.

Saranac Lake, N. Y.—The \$200,000 issue of Franklin County highway bonds has been sold to Suto Bros., of New York. There were eight bidders.

Schenectady, N. Y.—Paving of Ballston ave., Scotia, is being considered.

Schenectady, N. Y.—Villa rd. culvert improvement bonds to amount of \$25,000, and public market bonds to amount of \$90,000 have been sold to Parsons' Son & Co., of New York City.

Schenectady, N. Y.—Board has decided to advertise for bids on 12,000 gallons of road oil for sprinkling roads to keep down dust. Oil is to be of quality covered by specifications for oil used in Milwaukee when Commissioner Mullen was in charge of streets.

Syracuse, N. Y.—Preliminary resolution has been adopted directing Highway Department to prepare plans for county highway from Jordan village line to bridge over Seneca River, two miles north. Proposed highway from Solvay village to State Fair Grounds, crossing New York Central and West Shore tracks by viaduct, has been approved and resolution providing for its construction was adopted. New road will be 3,093 feet in length and will provide direct route from Solvay to State Fair.

Syracuse, N. Y.—Ordinances have been

adopted ordering paving of Livingston ave. and fixing cost at \$5,700; for paving Monroe st., from Grape st. to Orange st. and fixing cost at \$4,100.

Utica, N. Y.—Board has received plans and specifications, which were adopted, calling for proposals for paving Gray ave., from York st. to City st.; Ray st., from Court st. to south line of Roberts st., and for resurfacing of Hobart st. from Genesee st. to Oneida st.

Durham, N. C.—Purchase of electric street sprinkler is being discussed; estimated cost, \$3,500.

Winston-Salem, N. C.—Bond election will be held for voting of \$100,000 bond issue for improvement of streets and sidewalks.

Dickinson, N. Dak.—Steps have been taken for establishment of proposed improvement district on Villard, Sims, First ave. W. and First st. N., which includes widening of sidewalks, construction of suitable gutters, etc. Bids will shortly be advertised for.

Dayton, O.—Bids will be received by City Auditor until 12 o'clock noon, June 21, for sale of bonds in amount of \$45,000 for purpose of providing money with which to pay for repair and improvement of existing streets, as follows: Asphalt streets, \$25,000; brick streets, \$15,000; gravel streets, \$5,000.

Eaton, O.—Council has adopted resolution providing for paving of Main st. for distance of six squares, brick to be material used. Estimate cost of improvement is about \$30,000, \$8,000 of which will be paid by village and about \$5,000 by Ohio Electric Railway Co.

Massillon, O.—City Council has passed ordinance determining to proceed with paving of South Erie st. from end of present paving to corporation line. Also, Director Elsass reported engineer's estimates of cost of grading, graveling, curbing and guttering various streets as follows: Bell st., between Tremont and Walnut sts., \$468; Superior, between Walnut and Webb sts., \$1,571.60; Spruce, between Walnut and Webb sts., \$617.74; Rine, between Runser and Superior, \$931.69; Runser, between Walnut and Webb, \$1,767.96; Webb, between Runser and Superior, \$756.87; Highland, from end of curbing to Young st., \$497; West Charles, from West to west line of street, \$190.

Fort Clinton, O.—Road bonds amounting to \$8,400 will be sold by Trustees of Danbury Township. Proceeds will be used to resurface roads in township.

Youngstown, O.—County Commissioners have advertised for bids on roads from Ellsworth Center east and from Youngstown to Struthers, which are to be macadamized by State aid. One section of Ellsworth rd. has already been awarded, second section being 6,802.5 ft. long with width of 14 ft., estimated cost being \$12,606.48. Struthers rd. is 21 to 24-ft. pavement 6,177.2 ft. long estimated at \$26,377.40.

Hillsboro, Ore.—City Council has passed ordinances for pavement to be laid on about 10 blocks, and adopted resolutions for several blocks more. Gravel bitulithic is ordered on part of the work, rockolite on other streets, and one block of plank-ing, 75 per cent. of the adjoining property being empower to select kind of paving, some other streets have selected macadam, those being in residence district, with view to oiling surface when completed.

Junction City, Ore.—Council has recommended that all paving bids be rejected, which action was taken by Council.

Avoca, Pa.—Construction of paved highway by State is being discussed.

Chester, Pa.—Ordinances have been passed for improvement of various streets.

Erie, Pa.—Council is considering purchase of four flushing wagons for Street Department.

Hamburg, Pa.—Oiling of streets is proposed.

Hazleton, Pa.—Highway Committee of Councils has adopted ordinance to vacate 15th st., between Church and Laurel sts. Oiling of Chestnut st., Vine st. and number of other streets has been ordered.

Johnstown, Pa.—Ordinance has been passed providing for loan of \$30,000, to be appropriated to payment of cost of grading, paving and putting in proper condition highways in city of Johnstown, and providing for issue and sale of bonds to cover same. J. W. Cramer, City Clerk.

McKeesport, Pa.—Resolutions have been passed for repaving of various streets.

McKeesport, Pa.—Common Council has passed ordinance authorizing issue of \$15,000 worth of bonds for improvement of "missing link," Fifth ave., between Sinclair and Coursin sts., and that por-

tion of Sinclair st., between Fifth ave. and B. & O. crossing.

Pittsburgh, Pa.—Following tour of various streets scheduled for repaving, made by special Councilmanic sub-committee, it was agreed that every one of thoroughfares be recommended for immediate start. Budget of repaving was presented by Director Armstrong of Public Works Department recently, amounting to about \$60,000. Work includes portions of following streets: Allen st., from Warrington ave. to Lillian st., \$9,400; Middle st., from North ave. to Knoll st., \$3,800; Reed st., from Pride st. to Vine st., \$2,200; Rose st., from Overhill st. to Dinwiddle st., \$4,200; Tustin st., from Van Braam st. to Marion st., \$2,500; Harrison st., from 48th st. to 50th st., \$8,500; Adelaide st., from angle north of Camp st. to Milwaukee st., \$3,200; Millvale ave., from Center ave. to bridge, \$8,400; Devillers st., from Center ave. to Rose st., \$3,000; Saturn alley, from Alpine ave. to Stiles alley, \$1,400; Watson st., from Van Braam st. to Gist st., \$4,500; Fallowfield ave., from Broadway st. to Sebring st., \$8,500. Total, \$59,600.

Pittsburgh, Pa.—Commissioners of Allegheny County are preparing specifications for 13 miles of new roads at an approximate cost of \$272,500. Bituminous macadam will be specified. Roads selected for improvement and on which bids will be asked shortly are: Bakers-town to Culmersville, 5.95 miles, estimated cost, \$126,658. Spring Run rd. connecting Stoops Ferry and Shouse-town, estimate cost, \$36,595. West Run connecting West Homestead and Lincoln pl., 4.06 miles, estimated cost, \$96,570. Second and Center sts., Elizabeth Borough, 73-100 mile, estimated cost, \$12,710.

Shamokin, Pa.—Ordinance has been passed providing for paving and curbing of Carbon st., from south side of Arch st. southwardly to its intersection with north side of Chestnut st.

South Bethlehem, Pa.—Ordinance providing for issue of \$42,000 in bonds for permanent street improvements has been adopted.

Stroudsburg, Pa.—Engineers are surveying line for State highway, between Lehigh and Stroudsburg, 30 miles, but 75 miles by rail.

Towanda, Pa.—Ordinance for purpose of obtaining assent of electors of Borough of Towanda to increase indebtedness of said borough in sum of \$50,000 for purpose of paving business and residential streets in said borough as far as same can be paved therewith. E. T. Browning, President of Council.

Williamsport, Pa.—Petition is being circulated among residents of Market st., north of Southern ave., to have that stretch of road paved from Southern ave. to bridge, and it is understood that majority of property owners have signed the papers.

York, Pa.—County Commissioners have decided to place creosoted block floor on Market st. bridge to displace present plank flooring.

Tiverton, R. I.—Two bids for construction of one mile of macadam road from Tiverton Four Corners westerly have been received. Both were rejected, and engineer was directed to modify plans and advertise for new bids. Those submitted were: John A. Hathway, \$6,422.75; William Gordon, \$5,887.

Athens, Tenn.—McMinn County Pike Commissioners have advertised for bids on pike construction.

Ballinger, Tex.—Move was set on foot for good roads, and petition will be presented to Commissioners' Court asking for election for Commissioners' Precinct No. 1 authorizing issuance of \$150,000 worth of good roads bonds.

Cleburne, Tex.—Commissioners' Court has ordered election for good roads bond issue to be held in Venus precinct for July 18. Amount of issue to be voted upon is \$75,000.

Port Lavaca, Tex.—Commercial Club has taken up matter of bond issue for Precincts Nos. 1 and 2 of Calhoun County, and will take steps to have bond issue authorized immediately for \$200,000 to build road to connect with Victoria County and other roads now being built in western part of county. Bond issue for \$100,000 which was carried in Precinct No. 4 last March has been approved by Attorney General, and Bloomington-to-Port O'Connor road will be pushed to completion.

Sherman, Tex.—Bond issue of \$200,000 is being considered for street, sidewalk, light, sewerage and fire department improvement.

Ogden, Utah.—City Commissioners have opened bids for paving of Grant ave., between 23d and 24th sts., and Fowler ave., between 25th and 26th sts., and found

there was only one bid, that of P. J. Moran Construction Co., of Salt Lake. It was taken under advisement.

Salt Lake City, Utah.—By resolution City Commission has authorized paving of 14 letter streets on the north bench between South Temple and Third ave. with bitulithic pavement. Cost of improvement will be more than \$125,000.

Kentuck, Va.—Petition is being considered for election for voting on \$100,000 good roads bond issue.

Staunton, Va.—South River district of Augusta County will vote July 2 on \$250,000 bond issue to improve about 70 miles of roads.

Suffolk, Va.—Bids for paving of East Washington st., 5,000 sq. yds., have been opened. Strodtkick Bros., of Cincinnati, bid \$2.29 per sq. yd. for vitrified brick, concrete base; 65 cts. per lin. ft. for stone curbing. L. Lawson, Norfolk, bid \$2.21 for paving and 58 cts. for curb. Both bids specified Carlisle brick. All bids were rejected.

Pond du Lac, Wis.—Board of Supervisors of Pond du Lac County has voted to appropriate \$5,000 in order to secure \$2,500 from State and \$5,000 from city and surrounding towns for good roads construction. Entire amount will be expended on what is known as Oshkosh rd., leading north from city. Work will begin at once and be directed by State Highway Commission.

Windsor, Can.—Adoption of scheme which would involve expenditure of \$300,000 for good roads in Essex County has been advocated by President O. E. Fleming, of Windsor Board of Trade, at County Council session.

CONTRACTS AWARDED

Long Beach, Cal.—To Jas. O. Stanford, 1146 Lewis ave., for constructing cement sidewalks on Locust, Pine, Pacific, Cedar, Chestnut, 15th, 16th and Anaheim sts.; estimated cost, \$10,000.

Denver, Col.—By State Board of Capitol Managers, for repaving driveways around building, to F. H. Cowell, for 10 7-10 cts. a ft. Board estimates that cost will be between \$6,000 and \$7,000. Cement paving will be used in construction of new driveways.

Greenwich, Conn.—By City, for construction of permanent pavement on Boston Post rd., to Warren Bros., of Boston, for bitulithic construction.

South Norwalk, Conn.—For constructing 25,000 sq. yds. Roman road, to Joseph A. McElroy, of Norwalk. Samuel W. Hoyt, Jr., is City Engineer, and H. W. Mather is chairman of Street Committee.

Willimantic, Conn.—To Jones & Pocarro, of this city, to build 11,600 ft. of State highway in towns of Chaplin and Hampton, beginning at point about 1,000 ft. from the railroad crossing at Clark's Corner and toward Chaplin Center highway from North Windham.

Augusta, Ga.—By Streets and Drains Committee, to Creosoted Wood Block Paving Co., of New Orleans, La., to pave Barrett Plaza and Telfair st., between Jackson and Campbell, with creosoted wood block, guaranteed for 10 years, at \$2.90 per sq. yd., and to Georgia Engineering Co., to pave Marbury st., from Broad to D'Antignac st., with vitrified brick, guaranteed for 10 years, at \$2.07 a sq. yd.; and to Borothea Bowe, for paving Marbury st., from D'Antignac st. to Milledgeville rd., with granite block, guaranteed for 10 years, at \$2.53 per sq. yd.

Pocatello, Idaho.—For bitulithic paving on 20 blocks in business heart of this city, by City Council, to Strange & Maguire, of Salt Lake, at \$86.635 for guaranteed pavement, and \$85,329 for unguaranteed. There were four other bidders: Wiles Construction Co., Kennedy Construction Co., of Salt Lake; Warren Bros. Construction Co., and R. M. Bardsen, of Butte.

Belvidere, Ill.—For repairing State st. pavement, to John Fair, at \$1,336.80.

Danville, Ill.—By Road Commissioners of Danville Township, to Hoffman, Townsend & Co., Mt. Carmel, at \$62,300, for paving Georgetown rd., from Wabash bridge to town line of Belgium.

Peoria, Ill.—By Board of Local Improvements, for paving Ravine ave., to consist of removing present surface, renewing concrete foundation and resurfacing with a binder and asphalt course, about 9,348 sq. yds., to J. W. Bushnell.

Woodstock, Ill.—To Logan & Glertz, of Elgin, for paving in Woodstock for about \$30,000.

Covington, Ind.—By Board of County Commissioners, as follows: Gravel road in Shawnee Township, E. W. McKee, \$9,760; Millcreek-Cain Township gravel road,

S. S. Martin, \$8,630; Van Buren Township gravel road, J. A. Gangbey, \$7,800.

Kokomo, Ind.—To Kokomo Asphalt Paving Co., of Kokomo, for about 10,000 sq. yds. asphalt paving and 5,345 ft. combined curb and gutter, for \$21,000.

Clinton, Ia.—For paving to Carey & Sons, of Clinton, as follows: Excess grading, 100 cu. yds., 60 cts.; vitr. block paving, 12,900 sq. yds., \$2; pillar curb, 1,250 lin. ft., 84 cts.; combined curb and gutter, 2,506 lin. ft., 70 cts.; resetting old stone curb, 3,800 lin. ft., 25 cts.; gutter only, 194 lin. ft., 40 cts.; catch basins, 2 only, \$35; 10-in. vitr. pipe laid, 200 lin. ft., 40 cts.; adjusting adjacent paving, 10 connections, each, \$10; gutter plates, 500 lbs., 3 cts.; gutter curb, 100 lin. ft., 40 cts.; 3 track inlets, each, \$9; total, \$23,074. Total of other bids for vitr. block paving: Ford Paving Co., Cedar Rapids, \$30,366; McCarthy Improvement Co., Davenport, \$30,381; P. V. Clarke, Clinton, \$30,544, and C. B. McNamora & Co., Dubuque, \$29,925.

Des Moines, Ia.—For laying of bitulithic paving on Ingersoll ave., Tona-wanda drive, 33d st. and Polk blvd., by City Council to James Horrabin & Co. at \$1.95 a sq. yd. Des Moines Asphalt Paving Co. also entered bids for work. Its quotations were 4 cents higher than the successful bidder. Low price secured for bitulithic paving is resultant of fight between bitulithic people and so-called asphalt trust. Prices in other cities range from \$2.13 to \$2.25. Paving contract secured by Horrabin Co. is one of largest ever awarded by city at one time. It comprises 37,000 sq. yds., and will cost city and property owners \$62,150. Finest Bermuda asphalt and crushed granite will be used for paving.

Greenfield, Ia.—By City, for constructing cement concrete pavement, to D. W. Wright & Co., Bedford, Ia., at \$24,722.40.

Baltimore, Md.—By Board of Awards, for paving with Belgian block that portion of new thoroughfare between Bath and Hillen st., to David M. Andrews Co., in which Max Ways is prominent. Their bid, \$74,000, was low. The Cunningham Paving & Construction Co., of Philadelphia, the next lowest, quoting \$80,949.90.

Boston, Mass.—By Department of Public Works, to F. S. & A. D. Gore Corporation, Milton st., at \$8,325, for construction of asphalt pavement on Columbus sq. and Appleton st.

Lawrence, Mass.—To Thomas Fitzgerald, of Boston, for laying blocks on South Broadway, Andover and Merrimac sts.

Detroit, Mich.—By Common Council, for paving streets with cedar blocks, as follows: Military ave., J. S. Affeld, 429 Ford Bldg., \$14,877.18; Warren ave., Julius Porath, 34 McGraw Bldg., \$18,502.39.

Aurora, Minn.—By Town Board of town of White, to Andrew Thomson, for building four miles of road south of town, at \$915 per mile.

Havelock, Neb.—To J. C. Ries & Co., city, for construction of 10,000 sq. ft., more or less, cement sidewalks and 30, more or less, concrete street crossings.

Burlington, N. J.—By Burlington County Freeholders, to Howard Mathis, of New Gretna, to resurface gravel road, from Ballinger's Mills to Piper's Corner, at \$1.50 per cu. yd.

Middletown, N. J.—Three bids have been received by Middletown Township Committee for reconstruction of portion of Riverside Drive rd. that belongs to township. Collins Bros., of Port Monmouth, were lowest bidders, being \$1,045. E. T. Bennett, of Belford, bid \$1,087.50 for the same work and the Monmouth Construction Co., of Red Bank, offered to do the work for \$1,080. Contract was awarded to Collins Bros., the work to be completed by July 15.

Passaic, N. J.—By Director of Streets & Public Improvements, to John S. Lamson, Jr., of Summit, N. J., for 6,500-gal. tank car of dustoline, at 6¢ cts. per gal. Also to Standard Oil Co., for 24,000 gals. Standard asphalt road oil, at .0415 cts. per gal. Thomas R. Watson, City Clerk.

Fulton, N. Y.—By Board of Public Works, to W. J. Hartnett, of Fulton, for paving West Broadway, from west line of West First st. to D. L. & W. Railroad. Amount of bid was \$27,955.

Lockport, N. Y.—To Henry P. Burgard Co., of Buffalo, by Common Council, contract of Locust st. pavement. Asphalt and brick is to be used. Proposal was \$51,525.56.

Newport, N. Y.—To F. W. Begent Construction Co., of this place, to build 130-100 miles of concrete pavement in Lowville Village.

Rochester, N. Y.—By Board of Contract and Supply, for construction of Maplewood ave. pavement, to Whitmore,

Rauber & Vicinus, for \$37,435. Pavement is to form plaza around band stand in Maplewood Park. For asphalt pavement in Baldwin st., to Rochester Vulcanite Paving Co., for \$7,923. For resurfacing Greig st. went to Whitmore, Rauber & Vicinus, for \$7,851.

Schenectady, N. Y.—To Brown & Lowe, for three State highway contracts, work on which will begin as soon as possible. Contracts call for work to be done in St. Lawrence County and are in one stretch, 21 miles long. Entire job will cost \$214,548 and will require two years for its completion. Number, name and size of contracts are as follows: No. 968, Morristown-Ogdensburg, Part 2, 4.08 miles; No. 969, Morristown-Hammond, Part 1, 6.56 miles; No. 970, Morristown-Hammond, Part 2, 10.26 miles.

Utica, N. Y.—By Board of Contract and Supply, for paving Jefferson ave., Miller st., Holland ave. and Reagan pl. or Elmwood pl., to H. W. Roberts & Co.

Yonkers, N. Y.—By Board of Contract and Supply, to Frank Cianfaglione, at \$20,000, for regulating, grading and improving portions of Marquard and Cretwood aves. and Castle st., and to James J. Corbali, at \$9,185, for grading Rossmore ave.

Henderson, N. C.—By Street Committee, to R. G. Lassiter, Oxford, N. C., for about 15,000 sq. yds. of mixed bituminous surface on old macadam; 5,000 sq. yds. 6-in. penetration macadam; 5,000 lin. ft. of combined concrete curb and gutter, and 8,000 cu. yds. of grading.

Hillsboro, O.—By Commissioners of Highland County, to Bean & Terrell, at \$7,483, for grading and paving Fairfax-Sugar Tree rd. in Concord Township.

Toledo, O.—By County Commissioners, for material for road repairs, to France Co., Toledo Stone Co., Whitehouse Stone Co., Sylvania Stone Co., Toledo Stone & Glass Sand Co. Also Continental Bitumen Co., bid 12 cts. and 11 c. per gal. for binding, and R. W. Johnson bid 4¼ cts. per gallon for dust layer.

Toledo, O.—Paving contracts aggregating close to \$100,000 have been awarded by Board of Control. Contracts are about evenly divided between Andrews Paving Co. and Patrick Tansey. Latter secured contract for sheet asphalt improvement of portions of Indiana ave., figure being \$46,008.80. Awards given to Andrews Paving Co. are Michigan st., from Jackson to Adams, \$5,604.80; Main st., from Front st. to Star ave., \$19,403.40; Auburn ave., from Monroe to Central ave., \$22,202.40.

Youngstown, O.—By Board of Control, for Garfield paving, for \$23,945.20, and Worthington paving, to Fleming & Platt, for \$10,846.80; Darrow st. paving, to P. & P. J. Grady, for \$4,113.70; Hughes and Olivet court, for \$6,663.20, and Homer ave. paving, for \$9,203.20, to Miller Bros. All successful contractors were low bidders.

Youngstown, O.—By Good Roads Commission, contracts on five roads. All roads are of slag finish. Contracts were awarded as follows: Smith's Corners rd., Smith's Corners east ½ miles to Cornersburg, to L. H. Young, for \$11,215.78. Kirk rd., Kirk post-office west two miles to Rosemont, to Seiple & Wolf, for \$10,327.40. Lipke rd., Section 2, Trumbull county line south ¾ mile to Section 1, to C. E. Clemens, for \$3,371.50. Rosemont rd., Section 3, from Trumbull county line south one mile to Section 2, to same, for \$4,328.48. Rosemont station rd., Rosemont station west 1½ miles to Milton township line, to J. S. Woodrow, for \$5,754.16.

Brackenridge, Pa.—To James Topley & Co., at \$6,768, by Council, for paving of Cherry st. and Brackenridge ave.

Erie, Pa.—By City, for paving of East 26th st., to Mayer Bros., at \$1.02 per yd., from French to Ash sts., and to J. & M. Doyle, from State to French st., at \$1.47 per yd. Also to J. & M. Doyle, for asphalt pavement on East Eighth st., at \$1.47 per yd.

Lehighton, Pa.—By City, for paving its streets, to Horn & Neff, of Weissport.

Reading, Pa.—By Board of Public Works, to John K. Faust, curbstones, per lin. ft., 59½ cts. and 62 cts.; laying new brick sidewalks, per sq. yd., 93 cts.; old, 45 cts. To Reading Scale & Machine Co., cast iron work, 2½ cts. per lb.; allowance for old cast iron scrap, ½ ct. per lb.

Sharon, Pa.—For paving work on Sharpville st. and Boyce st., to William McIntyre & Sons, at \$1.93 per sq. yd.

Providence, R. I.—Contracts amounting to \$198,617.70 providing for construction of 29.9 miles of State highway in various sections of Rhode Island, have been awarded by State Board of Public Roads. Sections where new construction is to

be made, name of successful bidder and amount are as follows: North Smithfield, two miles, Amos D. Bridges, \$11,667.99. Foster, 4.9 miles, B. F. Giovini, \$31,820.07. Plainfield pike, running through Johnston, Cranston, Scituate, Foster and Coventry, 14 miles, Toni Leo, \$94,687.18. Richmond and South Kingstown, four miles, Bristow Bros. and Knowles Corporation, \$23,529.96. Richmond and Charlestown, three miles, E. J. Rourke, \$18,061. Westerly, two miles, Ahern Bros., \$13,851.50. All of new work is to be of bituminous construction, with exception of three miles in Richmond and Charlestown, which is to be waterbound macadam.

Benton, Tenn.—To McClary Bros. & Russell, for 4½ miles of pike, from Benton to Bradley county line.

Denison, Tex.—To R. V. McSpadden, of United Construction Co., by City Council, for paving of 100 block North Houston ave. and greater part of 100 block of East Woodard st., together with intersections. Mr. McSpadden's bid was 65 cts. per cu. yd. for excavation and \$2.15 for finished pavement, which is to be of Coffeyville No. 1 paving blocks.

El Paso, Tex.—By City Council, for paving of East Overland st., from east end of improvement district No. 1 to west line of Cotton ave., to Southwestern Construction Co., at \$1.65 per sq. yd. Bid of Texas Bitulithic Co. is \$1.77½ for same work.

Temple, Tex.—For paving North Main st. with vitrified brick, to Ockander Bros.

Cleveland, Va.—For grading public road from this place to Dump's Creek, distance of about three miles, by Board of Supervisors, to W. P. Gibson and H. M. Salter, local contractors.

Ellensburg, Wash.—By Kittitas County Commissioners, for paving of two miles of State aid highway running out of Ellensburg, to Dollarway Paving Co. Specifications call for 5-inch concrete base and patent surface called Dollarway paving. Cost is to be \$1.12½ cts. a sq. yd. Surface paved is to be 16 ft. wide, and is to start at city limits and run for two miles on State aid highway towards Thorp.

Puyallup, Wash.—Jobs of paving Meridian st., from end of present pavement to South Hill, and Railway ave. to city limits on west, have been awarded to Washington Paving Co., of Tacoma, by Puyallup City Council. Contract price for paving Meridian st. was \$22,532.40, and for Railway ave. \$15,612.50. Grade of paving to be used is known as granitoid. Different companies and contractors with their respective bids were: Meridian st., William Ollar, \$24,062.80; American Construction Co., \$18,965.40; George C. Dietrich, \$25,044.40, concrete base, and \$23,321, rock base; S. R. Gray, \$19,605.36, and X. Case, \$25,079.50. Their respective grades of paving were El Oso, Dollarway, asphalted concrete, Dollarway and bitulithic. For paving of Railway ave. their respective bids were: \$16,176, \$12,735, \$16,630, concrete base, and \$15,253 rock base; \$13,290 and \$16,901.

Spokane, Wash.—By Adams County Commissioners, to Naylor & Norlin, of Spokane, for construction of permanent highway No. 2, at price of \$16,250. Road will be two miles long, running out of Lind.

Tacoma, Wash.—For paving Delin st., G. South 38th and M sts., to Washington Paving Co., of Tacoma, for \$69,147. Paving will be asphalt and will be finished before fall. Washington Paving Co. also was successful bidder for paving South Tacoma rd. Other bidders for Delin st. and amounts of their bids for asphalt were as follows: A. H. Robinson, \$71,700; Joseph Worter, Sr., \$74,550; Keasal Construction Co., \$71,300.

Columbus, Wis.—By City, for paving of Broadway, James and Ludington sts. with mixed asphalt concrete paving, using Bermudez, with exception of two blocks which are to be of Dollarway, to Nelson-Weber Construction Co., of Oconomowoc, Wis. Unit prices are as follows: Asphalt concrete, \$1.61 per sq. yd.; Dollarway, \$1.22 per sq. yd.; excavation, 30 cts. per cu. yd.; curb and gutter, 45 cts. per lin. ft. W. A. Peirce, City Engineer.

SEWERAGE

Athens, Ala.—Taxpayers have voted in favor of issuing \$38,000 bonds for sewer extension and water mains and to install large electric plant.

Gadsden, Ala.—Citizens of Alabama City will be asked to vote on bond issue of \$50,000 for installing sewerage system, building water works plant and erecting new City Hall.

Los Angeles, Cal.—Hollywood Board of Trade has filed petition with City Council and Board of Public Works asking that

system of street sewers be installed at Hollywood at time main sewer is built from Hollywood to outfall sewer.

Los Gatos, Cal.—As preliminary step for proposed bond issue for municipal improvements, it was voted by Board of Town Trustees to have Town Engineer Frank A. Nikirk proceed to prepare plans and estimate of cost of improved sewer system, including septic tank and filling beds, also for concrete culverts on Santa Cruz ave. and Massol ave.

Pomona, Cal.—Committee headed by Engineer Olmstead, of Alhambra, has appeared before Council in interests of proposed outfall sewer to connect 18 cities of San Gabriel and Pomona Valleys. Proposed line will be natural drain for 160,000 acres of citrus land.

San Francisco, Cal.—Lowest bid received by Board of Public Works for completion of section of North Point main sewer at Sansome, Market and Second sts., was that of Daniel Construction Co.

Santa Ana, Cal.—City Council has sanctioned payment of \$3,500 for purchase of right of way from Willow Land Co. for outfall sewer to run a mile and fourth to ocean and completing right of way from city limits to sea.

Grand Junction, Col.—New sewer system will be installed at a \$2,500 cost.

Fort Dodge, Ia.—City Engineer C. H. Reynolds has recommended that city put in sanitary sewers similar to those in operation now on 19th st. south, between Fifth ave. south and Fourth ave. north. Resolution of necessity from City Engineer C. H. Reynolds for 10 blocks of sanitary sewers has been accepted.

Hermann, Mo.—Bond election will be held July 20 for voting \$6,000 for main trunk sewer.

Camden, N. J.—It is the intention of city to construct following sewers or drains in and along Mickie st., from Marlton ave. to 26th st., and 24th st., from Mickie st. to Carman st. A. L. Sayers, Street Commissioner.

Hightstown, N. J.—Hightstown Council is planning to call special election to decide proposition of bonding town to install sewer and disposal plant.

Newark, N. J.—In accordance with terms of contract made between Orange and West Orange steps will be taken at once by Sewer Department of former municipality to lay drains to carry off surface water on Main st. Agreement to lay this drain was made by Orange when West Orange granted permission to lay mains to and from new storage reservoir.

Newark, N. J.—Passaic Valley Sewerage Commissioners have rescinded contract awarded to Donlon Construction Co., of Brooklyn, for construction of Section 15 and have declared company's check for \$3,000 forfeited to Commission. Commission has decided to readvertise for proposals to be received June 25.

Perth Amboy, N. J.—City will lay 15-in. pipe sewer with house connections in Division st., from Broad st. to New Brunswick ave., to connect with sewer now in New Brunswick ave. W. La Roe, City Clerk.

Jamaica, L. I., N. Y.—Local Board has adopted petition for construction of sewer in Jamaica ave., from Shaw ave. to Ferry st., Forest Parkway, from Jamaica ave. to Ashland ave., Ferry st., from Jamaica ave. to Ashland ave., and in Ashland ave., from Shaw ave. to Ferry st. This sewer, which is to be in Woodhaven section, will cost, it is estimated, \$10,400. Petitions were adopted for construction of various other sewers.

Middleport, N. Y.—Village of Middleport has sold its sewer and water bonds in amount of \$104,000, to lowest bidder, Douglas, Fenwick & Co., of New York City.

Schenectady, N. Y.—City Engineer Wooley's specifications for sanitary sewers on Maplewood ave., Arthur st., Broad st. and 12th st. have been accepted. Contracts will not be advertised, as city will do work itself, but bids will be asked for furnishing tile piping, cement, brick, etc., needed on jobs.

Winston-Salem, N. C.—Election will be held for voting on \$85,000 bond issue for extending and equipping existing sewerage.

Altosna, Pa.—By the time citizens approve proposition for loan of \$100,000 to be used in extending city sewer system and for building filtration plant, at special election on June 25, providing affirmative majority is recorded, it is expected that plans will be in readiness and steps may be taken for beginning the work.

Boyetown, Pa.—Boyetown's Board of Health will demand from Council better sewerage.

Erie, Pa.—Councilmen have decided to readvertise for bids on construction of Sixth Ward storm water sewer.

Johnstown, Pa.—Ordinance has been passed providing for sewers in Peach alley, Vickory ave. and Ferndale ave., in Borough of Ferndale. H. M. Hammer, President of Council.

Reading, Pa.—Mayor Stratton has signed ordinance for construction of storm water sewer on Maple st., from point 110 ft. south of Cotton st. to Culvert st.

Woonsocket, R. I.—Resolution providing for addition of \$4,036 to sewer construction appropriation has been referred to Finance Committee, and ordinance providing for sewers on Grove, Crawford and Winter sts. and on Wayland rd., has been passed and ordered communicated.

Dallas, Tex.—James H. Fuertes, hydraulic engineer who designed plans for filtration bed at Turtle Creek reservoir, has been retained by city as consulting engineer to prepare plans and specifications for sewage disposal plant for this city.

Forth Worth, Tex.—Following inspection of drainage conditions, Street Commissioner Maddox has decided upon storm sewer from Seventh and Magnolia aves. to Morphy st. and Sixth ave., as best means of relieving conditions in that section.

Brigham City, Utah—Town of Tremonton is contemplating installation of sewerage system, which is practically assured by subscription to fund of \$2,000 by business men of town.

CONTRACTS AWARDED

Hartford, Conn.—By Board, for Homestead ave. and Windsor st. sewers, to Dominick Neri, the figures being \$1,054 and \$3,103.50. Contract for Pleasant st. sewer was awarded to Hartford Paving & Construction Co., at \$2,906.75. All contracts went to lowest bidders.

Macon, Ga.—For building seven miles of new sewers in Macon, to Dysard Construction Co., of Atlanta, for \$30,000.

Goshen, Ind.—To Sheridan & Green, 206 E. Lincoln st., for construction of sewer in First st.

Indianapolis, Ind.—By Board of County Commissioners, for sewage disposal plant at Asylum for Incurable Insane at Julietta, to Dennis Bush, the low bidder, at \$1,744. George Schauer, only other bidder, asked \$1,800.

Reinbeck, Ia.—For sewer system, to include six miles of sanitary sewers, 8 to 15 in., to M. A. Camery, of Harlan, and outlet to M. Tschirgi & Sons, of Dubuque.

Stillwater, Minn.—For constructing 2,578 ft. pipe sewer on South Second st., to Fraser & Danforth, of St. Paul, for \$7,240.

Falls City, Neb.—For construction of sewers in District No. 2, to Parks Leffer & Co., South Omaha, Neb., at \$32,000.

South Amboy, N. J.—By Council, for furnishing receiving basins for storm sewer on Broadway. There were three bidders, J. F. Shanley Co., of Newark; P. J. Monaghan and Collins & Gundrum, of South Amboy. Contract was awarded to J. F. Shanley Co. as lowest bidders. For Mechanicsville section of sanitary sewer, P. J. Monaghan, of South Amboy, \$10,139; Collins & Gundrum, of South Amboy, \$9,635, and Liddle & Pfeiffer, of Perth Amboy, \$10,900. Contract was awarded to Collins & Gundrum as lowest bidders. Bids were next opened for construction of about 800 ft. of sewer on Thompson st. and about 500 ft. of sewer on Bordentown ave.: Liddle & Pfeiffer, of Perth Amboy, bid for Bordentown ave. section \$900, Thompson st. \$3,983.70. John Quinland, of South Amboy, Bordentown ave. section, \$550; did not bid on Thompson st. section. P. J. Monaghan, of South Amboy, bid on Bordentown ave. section, \$1,160; Thompson st. section, \$3,552. Collins & Gundrum bid on Bordentown ave. section, \$1,955; Thompson st. section, \$2,981. Contract for Thompson st. was awarded to Collins & Gundrum as lowest bidders, and that for Bordentown ave. section to John Quinland.

Syracuse, N. Y.—By Syracuse Intercepting Sewer Board, to Marnell Co., at \$20,886, to extend Harbor Brook improvement and intercepting sewer to city line.

Canton, O.—To construct about nine miles of sanitary sewers in District No. 4, to Thomas G. Chapman, Lorain, O., at \$22,785.

Beaver, Pa.—By Borough Council, to C. D. Beemer, city, for construction of 240 lin. ft. 8-in. sanitary pipe sewer.

Erie, Pa.—By City, for construction of sewer in East 24th st., to Joseph Mc-

Cormick & Bro., at 78 cts. for 9-in. pipe, and 50 cts. for 6-in. pipe, \$1 for Y and T branches and \$40 for manholes.

McKeesport, Pa.—By City, for construction of Ninth Ward sewer to connect with Patterson ave. sewer in 11th Ward, to J. B. Sheets & Co., at price slightly over \$53,000.

Providence, R. I.—By city, for Blackstone blvd. and Hope st. sewer, to Charles Crankshaw, who was lowest bidder with \$41,560.50. Other bidders were Frederick E. Shaw, \$42,980.95; Burns & Pettitt, \$49,365.80, and F. A. Gammino, \$50,809.75. Frederick E. Shaw, with a bid of \$1,286.40, landed Fairview and Frederick st. job. Only other bidder was N. A. Gammino, who bid \$1,360.10. Charles Field and Commodore sts. job was also awarded to Mr. Shaw, who was only bidder, with \$740.40.

Galveston, Tex.—By Board of County Commissioners, for excavating drainage ditch at Texas City, to F. Freund, at 14 1/4 cts. per cu. yd. Other bids were as follows: J. C. Kelso, 17 9-10 cts.; Moore & Amburn, of Texas City, 19 1/4 cts.; J. L. Corbett, 21.99 cts. Work calls for approximately 26,800 cu. yds. of excavation.

Watertown, Wis.—To construct sanitary and storm sewers, to E. L. Bartlett, at \$8,167.

WATER SUPPLY

Athens, Ala.—Taxpayers have voted in favor of issuing \$38,000 bonds for water mains and sewer extensions, and to install electric plant.

Attalla, Ala.—Application for franchise to enter Attalla has been made before City Council by Alabama Power & Development Co., which is headed by Col. R. A. Mitchell. Attalla wants a water works plant and Col. Mitchell has informed Council that his company will install \$20,000 plant to supply town.

Gadsden, Ala.—Citizens of Alabama City will be asked to vote on bond issue of \$50,000 for building water works plant, installing sewerage system and erecting new City Hall.

Ashdown, Ark.—Construction of municipal water works is contemplated.

Fort Smith, Ark.—Construction of filtration plant and pumping house, to cost \$130,000, has been authorized by Board of Commissioners.

Berkeley, Cal.—Municipal ownership of water works is being urged.

Los Angeles, Cal.—Value of property owned by San Pedro Water Co., including its entire distributing system, is \$100,146.56, according to appraisal of Board of Public Utilities, has been sent to Board of Public Service. Cost of reproducing plant is estimated at \$142,779.74. There is some probability that Water Department will recommend that city purchase system and improve it.

Washington, D. C.—American consul reports that Latin-American municipality is about ready to install new pipes for its entire water system and desires to buy several carloads of pipe from 6 to 12 in. Prices on this material are desired as soon as possible. All correspondence should be addressed to individual named in report. No. 8983, Bureau of Manufactures.

Rome, Ga.—Board of Public Works and City Council of Rome have decided to install meter system and to require all water consumers to use meters. It is estimated that at least \$10,000 will be spent by property owners in equipping their premises with measuring apparatus.

Valdosta, Ga.—Bond issue of \$50,000 will be voted on for enlargement of water plant.

Coeur d'Alene, Idaho—Ordinance has been passed authorizing city ownership of water system.

Fort Dodge, Ia.—Petition has been received for water mains on 12th ave. south, between 19th and 20th sts. north to 11th ave. south and 21st sts.

Muncie, Ind.—Appropriation of \$17,000 has been voted by Council for water works system.

West Terre Haute, Ind.—Plans are being discussed for water system; estimated cost, \$35,000.

Harlan, Ky.—Installation of municipal water works is under consideration.

Haverhill, Mass.—Engineers of Water Board are busy preparing plans for new reservoir which is to be built on Dead Hill. New tank will have capacity of about 3,000,000 gals., and present reservoir will be held as reserve, new one being much nearer to pumping station at Johnson's Pond.

New Bedford, Mass.—Petitions have been received for extension of main water pipes.

Newaygo, Mich.—Installation of new water system is being discussed.

Bethany, Mo.—Plans are being prepared for water works and electric lighting improvements, for which bonds were recently voted. Burns & McDonnell, Consulting Engineers, Kansas City, Mo.

Hermann, Mo.—Plans and specifications have been received for water works, and bond election has been called for July 20 to vote \$35,000. Burns & McDonnell, Consulting Engineers, Kansas City, Mo.

North Platte, Neb.—City is advertising for bids on 200 tons of cast iron pipe, etc. C. F. Temple is City Clerk, and Hershey S. Welch is Water Commissioner.

Palmer, Neb.—Installation of water works system is being considered.

Perth Amboy, N. J.—Plans of laying proposed extension of city's 24-in. water main across south shore meadows have been discussed at length at committee meeting of Board of Water Commissioners.

Middleport, N. Y.—Village has sold its water and sewer bonds in amount of \$104,000 to lowest bidder, Douglas, Fenwick & Co., of New York City.

Oswego, N. Y.—Department of Water will petition Common Council to appropriate sum of \$5,000 for extending of water mains in various streets.

Winston-Salem, N. C.—Election will be held for voting on \$50,000 bond issue for extension of water mains and improvement of water works system.

Fargo, N. Dak.—One bid has been received by City Council for sinking 6-in. test well at municipal water and light plant but was rejected. Bid was that of W. G. Packard, of Elliott, N. Dak., who asked \$4 a ft. up to 150 ft.; \$3.75 per ft. up to 200 ft., and \$3.50 per ft. for sinking well if it proved necessary to sink it 250 ft. Council considered bid too high, and new bids will be advertised for.

Cleveland, O.—Negotiations preliminary to establishment at Fairmount pumping station of first municipal heating plant are progressing favorably.

Youngstown, O.—F. M. Lilley, Engineer, City Bldg., is preparing plans for concrete reservoir and dam to be constructed in Mahoning River for Board of Public Service.

Wagoner, Okla.—Sum of \$31,000 will be expended on water and light plant.

Ebensburg, Pa.—County Commissioners have authorized County Controller Campbell to advertise for bids on drilling of well to supply jail with water. County Commissioners propose to get price on private water plant.

Ethan, S. Dak.—Installation of municipal water works system, to cost \$7,500, has been authorized.

Fort Worth, Tex.—City Commission, upon recommendation of Board of Engineers, has approved substitution of canal in place of settling basin at first proposed as part of West Fork reservoir system. New plan will shorten pipe line distance over 8,000 ft.

Lockhart, Tex.—At meeting of City Council Joe E. McDowell was granted franchise to lay water pipes and other appliances on streets and alleys.

Waco, Tex.—Bond issue of \$400,000 has been purchased by Commerce Trust Co., of Kansas City. Proceeds will be used in installing immense water filtration plant, in erecting few reservoirs in high elevations and extending mains to unserved sections of city.

Lynchburg, Va.—Resolution has been passed authorizing laying of 8-in. main on Eighth st., between Court and Main sts., at cost not exceeding \$1,000; also resolution authorizing laying of 6-in. main on 12th st., from Wise to Taylor sts., and on Taylor to 10th sts., at cost not exceeding \$1,200.

Latah, Wash.—Special election is being held to decide whether this town shall have water and electric light plant.

CONTRACTS AWARDED

Salida, Col.—To lay 7,000 ft. of 16-in. continuous wood stave pipe and 6,000 ft. of 12-in. cast iron pipe, to Marshall Bros., Las Animas, Col. at \$8,912.

Ft. Sheridan, Ill.—For installing pressure filtration plant, as follows: Filters, American Water Softener Co., Philadelphia, Pa., \$15,150; pumps, Wm. A. Pope, Chicago, \$17,454, and heating, G. E. Gundling, Chicago, \$595.

Herrin, Ill.—For construction of water system, to H. H. Hall & Co., East St. Louis, Ill., at \$56,463.

South Bend, Ind.—To Henry R. Worthington, for "Snow" 10,000,000-gal. pumping engine. Burns & McDonnell, Consulting Engineers, Kansas City, Mo.

Holyoke, Mass.—For completion of work of Fomer reservoir dam, to Daniel O'Connell & Sons.

Manchester, Mich.—For furnishing material and constructing water works from plans of Geo. Champe, 610 Nasby Bldg., Toledo, O., to Fitzgerald & Co., of Lima, O., for \$33,738.

St. Louis, Mo.—For laying 30,000 ft. of water pipe, as follows: Lettings Nos. 10,554 and 10,556 to B. D. Reilly, at \$18,719 and \$22,511; letting No. 10,555, to Clifford Contracting Co., at \$22,459.

Louisville, Neb.—For constructing water works, to Alamo Engine & Supply Co., of Omaha, for \$14,793.

Hubbard, O.—By Council, for construction of water works, to Central Construction Co.

Erie, Pa.—To construct 3,500,000-gal. mechanical filtration plant here, to Henry Schenk & Co., Erie, at approximately \$500,000. Plans were prepared by Chester & Fleming, Consulting Engineers, Pittsburgh.

Brownsville, Tex.—For first part of irrigation system, to Smith & Whitney, at \$16,000.

Cleburne, Tex.—For improving and extending water system by city, as follows: Furnishing pipe, to American Cast Iron Pipe Co., at \$27 per ton for 6- and 8-in., and \$29 for 4-in.; valves and hydrants, to Columbia Iron Works; compressor, to A. M. Lockett & Co.

Melfort, Sask.—By city, for water works improvements, as follows: For 29,000 ft. pipes and specials, to Drummond & McCall, Montreal, Que., for \$18,999; hydrants and valves, to Canada Foundry Co., Winnipeg, Man., \$1,249; trenching and laying, to John Craig, of Prince Albert, for \$19,997; 13,000 ft. vitr. sewer pipe, to J. A. Broby & Co., of Fernie, B. C., for \$26,149, and storage tanks, to Western Dry Docks & Shipbuilding Co., of Port Arthur, Ont., for \$1,910.

LIGHTING AND POWER

Athens, Ala.—Taxpayers have voted in favor of issuing \$38,000 bonds to install electric plant, and for sewer extensions and water mains.

Blackshear, Ga.—Citizens are contemplating bond issue of \$10,000 for construction of municipal electric light plant.

Indianapolis, Ind.—Board of Public Works has asked City Controller Wallace to recommend to City Council ordinance appropriating \$5,000 additional for city's street lighting fund. Board contemplates placing number of additional street lights, while part of the proposed appropriation will be used in making up deficit in cost of lights already installed.

Princeton, Mass.—Citizens will shortly vote on proposition to construct electric light plant, to furnish electricity.

Bloxi, Miss.—Estimates of cost of municipal lighting plant, together with outside lines and poles, with sufficient power to furnish municipal and commercial needs have been furnished Light Committee of Council by Anderson Offutt, electrical engineer of New Orleans. Estimated cost of plant that will furnish about 38 per cent. more street light than now, operate water works pumps that will shortly be installed, and furnish commercial service, is about \$75,000.

Bethany, Mo.—Plans are being prepared for electric lighting and water works, for which bonds were recently voted. Burns & McDonnell, Consulting Engineers, Kansas City, Mo.

Libby, Mont.—Specifications are now being drawn for lighting system for business district in Libby, which is to be installed as soon as work can be done.

Niagara Falls, N. Y.—Luminous arc two on pole with poles placed 60 ft. apart, has been selected for decorative illumination of Falls st.

Oswego, N. Y.—Ornamental lighting of business sections is being discussed; estimated cost, \$8,000.

Dickinson, N. Dak.—Steps have been taken for erection of ornamental lamp posts on streets where it is contemplated to establish modern system of lighting known as "White Way."

Postoria, O.—Council has granted 35-year lighting and power franchise to E. O. Cross, superintendent of glass plants of General Electric Co., who represented American Gas & Electric Co.

Wagoner, Okla.—Sum of \$31,000 will be expended on light and water plant.

Philadelphia, Pa.—Specifications for maintenance of gasoline street lamps under contract to be executed for 1913 has been made public by Morris L. Cooke, director of Department of Public Works. Present contract is with United Gas Improvement Co. Advertising will begin this week so that there may be widest competition.

Lincoln, R. I.—Installation of additional electric lights on various streets is being discussed.

Tiverton, R. I.—Town Council has voted, in accordance with action of town at its annual financial town meeting, to offer to contract with William E. King for furnishing of 40 street lights for one year from first day lights are in operation to be lighted by gas manufactured by Fall River Gas Works Co.

Livingston, Tenn.—Citizens are organizing company to construct and operate gas plant.

Dallas, Tex.—Installation of ornamental street lighting system on Main and Commerce sts. is being considered.

Denison, Tex.—Saturday, June 29, the qualified voters of Denison will have opportunity to vote on acceptance or rejection of natural gas franchise now being sought by E. R. Brown and L. B. Denning, said to be representatives of Standard Oil Co.

Sherman, Tex.—Natural gas franchise has been granted to E. R. Brown and associates to pipe natural gas into city of Sherman.

Ellensburg, Wash.—City Council has granted petition of W. C. Wright and others to connect with city electric power line, so that they can have electric lights and power on their ranches.

Latah, Wash.—Special election is being held to decide whether this town shall have electric light and water plant.

CONTRACTS AWARDED

New York, N. Y.—For installation of electrical equipment on Third and Willis aves. bridges, to Snare & Triest, 143 Liberty st., New York, at \$31,840.

Jamestown, N. Dak.—For installing Jamestown's "White Way," to Grambs & Peet Co., of Bismarck.

FIRE EQUIPMENT

Los Angeles, Cal.—New fire station, to cost \$20,000, will be erected on Western ave.

Los Angeles, Cal.—Offer to install complete fire and police alarm system for cost, plus 10 per cent., was made to city by Cregier Signal Co., of Chicago.

San Francisco, Cal.—Installation of auto fire apparatus in connection with auxiliary fire protection system is recommended.

Thompsonville, Conn.—Resolution has passed authorizing purchase of auto hook and ladder truck at cost of about \$5,000.

Fort Lauderdale, Fla.—Council has voted that order be immediately placed for first-class fire engine, horse-drawn, and 1,500 ft. of hose.

Tampa, Fla.—Purchase of two combination chemical and hose wagons, to cost about \$10,000, has been authorized.

Decatur, Ill.—Erection of fire house at Locust and Jasper sts. has been authorized.

Waukegon, Ill.—Plans have been prepared for erection of new fire station.

Dubuque, Ia.—Purchase of new fire truck has been authorized.

Muscataine, Ia.—Purchase of new hose, nozzles, etc. has been ordered.

Sioux City, Ia.—City Clerk will shortly advertise for bids on 3,000 ft. of fire hose.

Lafayette, La.—Fire Department is seeking improvements in fire service. It desires central fire station and fire alarm system.

Baltimore, Md.—Contract for fire hose for Fire Department, specifications for which were protested against by Manhattan Hose Co., of New York, will go either to Eureka Fire Hose Co. or to Gutta Percha & Rubber Manufacturing Co., both bidding \$1.10 per ft. Eureka company, however, included in their bid guarantee for their hose to withstand pressure of 400 lbs. to sq. in. and to last three years. Fabric Fire Hose Co. was only other bidder, quoting \$1.20 per ft.

St. Joseph, Mo.—Board of Public Works is considering purchase of auto apparatus for fire department.

St. Louis, Mo.—Bill providing for engine house No. 50, to be located on Newstead ave., between Forest Park blvd. and Duncan ave., has been introduced in City Council for Board of Public Improvements. New engine house will be the most modern in St. Louis, according to Fire Chief C. E. Swingley. It will be built to accommodate automobile apparatus.

Butte, Mont.—Fire and Water Committee will bring matter of purchase of combination hose and auto truck for Fire Department and automobile known as "flying squadron" for the Chief before Council.

Manchester, N. H.—Board of Mayor and Aldermen has passed order recommending site and erection of engine house south